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OCTOBER 1948

BUSINESS · ENGINEERING · INDUSTRY

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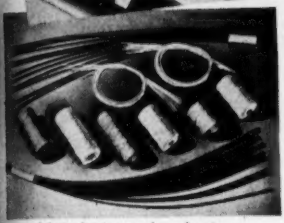

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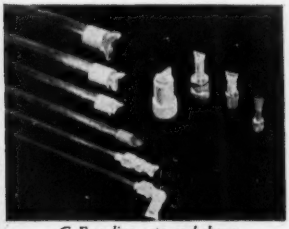

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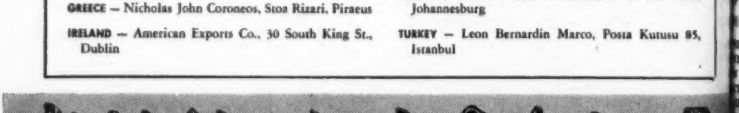

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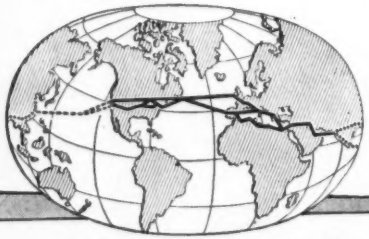

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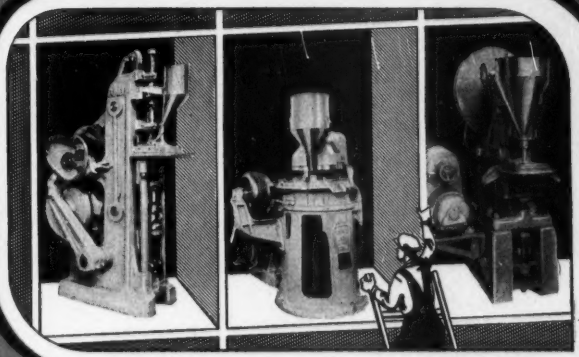

A PRESS too large or too small for your long-term needs will show in the cost of every unit it produces. For advice on how you can use powder metal at a profit in *your* business; for help in press selection, punch and die design, powder formulas, or related problems . . . consult Stokes.

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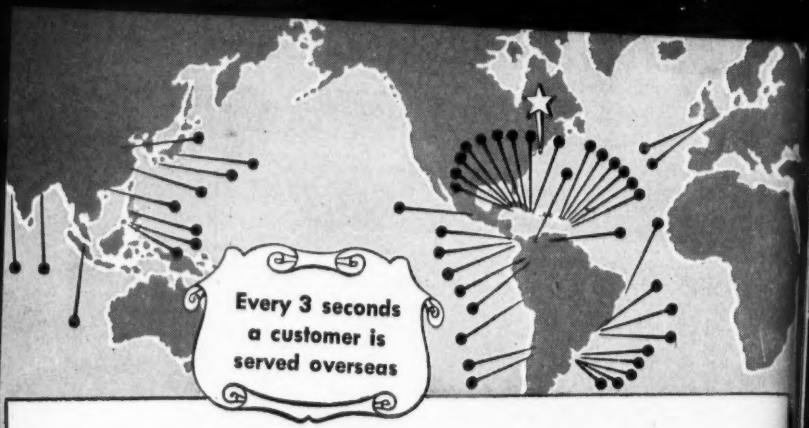

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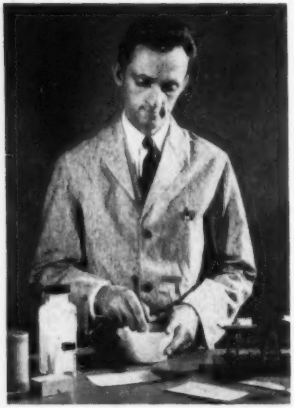

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Benzyl Benzoate, U.S.P.
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Methyl Salicylate, U.S.P.
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Phenol, U.S.P.
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Acetophenetidin, U.S.P.
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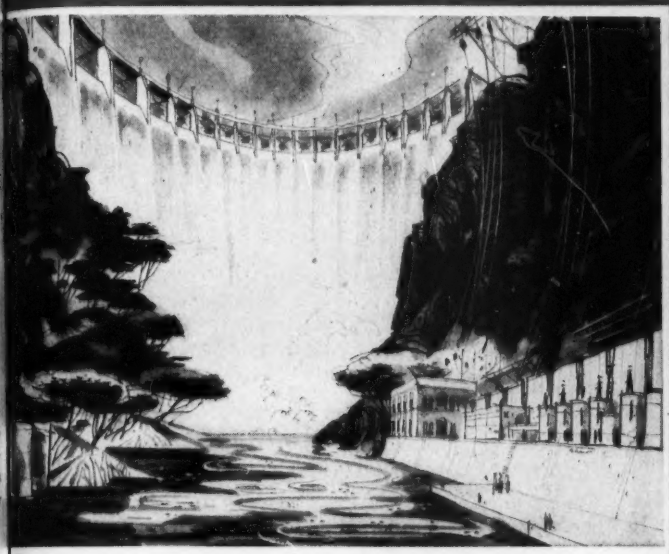

Turning Cascades into Kilowatts!

HERE is how science converts the force of falling water into electric light and power for homes and factories the world over.

Increased use of water power is an example of science and industry using nature's resources to aid good living. And helping make this possible are many A-C products.

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CLARK

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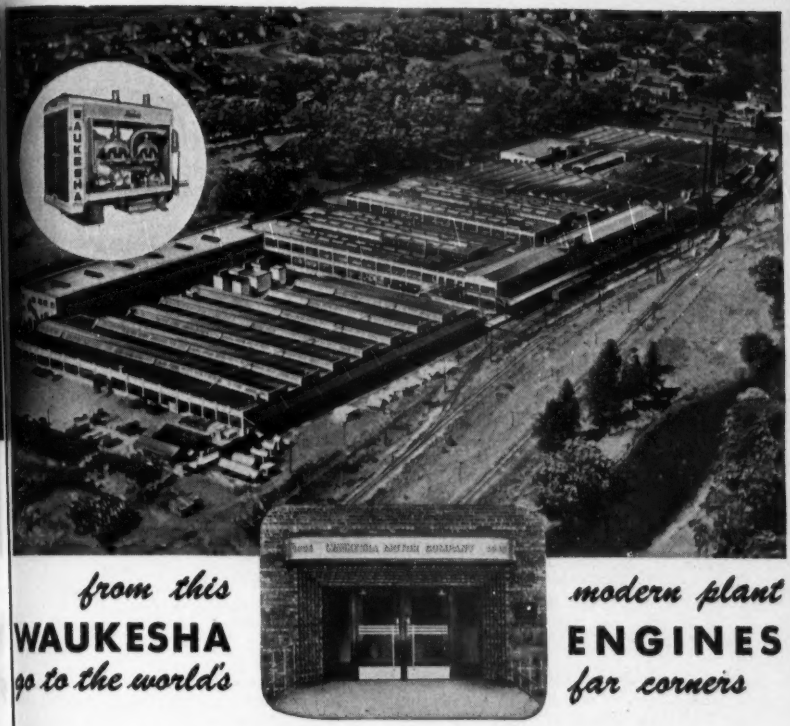

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modern plant **ENGINES** *far corners*

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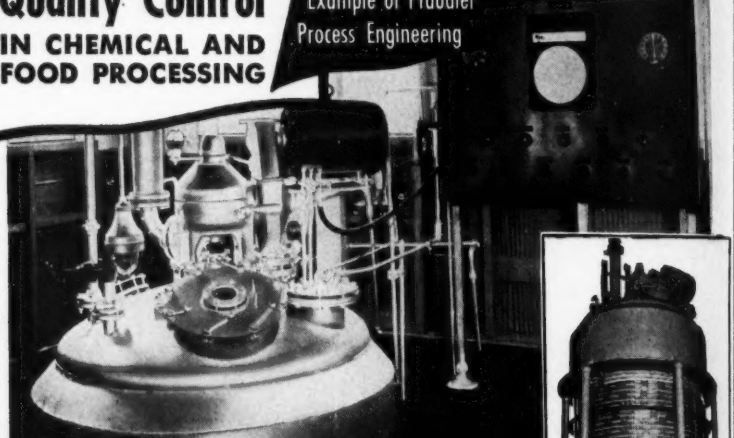
Ask for brochures describing engine types of interest and name and address of Waukesha distributor or dealer serving your territory.

WAUKESHA MOTOR CO., WAUKESHA, WIS., U. S. A.

AUTOMATIC
Quality Control
IN CHEMICAL AND FOOD PROCESSING

ANOTHER Example of Pfaudler Process Engineering



Above: Pfaudler polymerizer with automatic controls for heating and cooling synthetic resins. ***Inset:*** Polymerizer showing banks of electric heating elements. Turbine type agitator with foam breaker is used for mixing.

Quality control of many chemical and food products is being obtained *automatically*. The production of synthetic resins and varnishes shown above is a typical example from Pfaudler's files.

This electrically heated Pfaudler stainless steel polymerizer has stepped up production *besides* making automatic control possible. Greater processing *flexibility* has been obtained, permitting the use of the equipment for other purposes. Little supervision is required. Costs have been reduced. Fire hazard is virtually eliminated.

This is the type of engineering and equipment fabrication Pfaudler offers its customers in the chemical and food processing industries. Take advantage of this know-how which is based on over 60 years experience in these fields. Your inquiries are invited and will receive prompt attention.

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ENGINEERS AND FABRICATORS OF CORROSION RESISTANT PROCESS EQUIPMENT

Glass-Lined Steel Stainless Steels Nickel Inconel Monel Metal

BUSINESS TRENDS

WHAT IS HAPPENING to U. S. foreign trade tells a story of industrial recovery abroad and dollar shortages nearly everywhere. In first half of 1948, U. S. exported $6.6-billion of merchandise, down 17% from the same period last year. But imports jumped to $3.5-billion, 22% higher than year-ago levels.

European Recovery Program deliveries over the balance of this year will check the decline in exports somewhat. For the year, exports should be no more than 10% below 1947's record total of $15.3-billion. Imports, climbing nearly every month, should total $7-billion or better in 1948, some 23% ahead of last year. Despite higher prices, imports will gain in actual volume.

On the export side, crude materials showed the biggest drop (23%), with manufactured foodstuffs not far behind (21%). Semi-finished and finished manufactures, while down about 15%, accounted for over three-fourths of all exports; these include machinery, vehicles, leather, chemicals, and metal products. Electrical machinery was practically unchanged, while agricultural equipment increased 29% to $195-million.

Steel exports, despite world demand, dropped 25%. Foreign buyers will look in vain for much increase here. Future steel shipments will be larger than in recent months, but exports will total less than in 1947. Exports for 1948-49 fiscal year to ERP countries are predicted at 2.3-million tons, to other areas at 3.7-million tons—far less than requested. These figures, made by the agency that licenses steel exports, should be reasonably accurate in the light of current conditions and policies.

Character of imports varied considerably, but all increases, excepting for manufactured foodstuffs and a few other items, were large. Crude materials were up 17%, crude foodstuffs 23%, raw wool 45%, petroleum 60%. The whole situation immediately portrays a more realistic basis for U. S. exports and the hope of more dollars for a dollar-starved world.

THE ECONOMIC HEALTH OF THE U. S. has just been reported on by the President's Council of Economic Advisors. The Council sees no early end to the boom, believes business conditions sounder now than a year ago. Council too is satisfied there is no danger of a collapse in business spending on capital goods. But there is a downtrend here, offset so far by large expenditures by utilities and oil companies. If it continues into 1949, it could cause trouble.

The Council admitted one major fear—that producers in some lines may have priced themselves out of part of the market. So far, high prices have not cut the total of consumer buying, but consumers are changing the pattern of their buying. More income is going for household appliances, automobiles, and other durable goods. Less is being spent on clothing, shoes and luxury

goods. This trend is expected to continue, affecting both domestic production and the import market.

THE EUROPEAN RECOVERY PROGRAM is moving ahead rapidly, despite many problems yet to be solved. A trend in the right direction is shown by the fact that the $105-million procurement authorizations for the week ending Aug. 14 is 25% for recovery, the rest for relief. This compares favorably with the first $1-billion authorizations, where only 12% was for recovery items. Too much relief, not enough recovery could ruin any chance for the program's success.

Another problem is how to use the counterpart funds (local currency deposits made by ERP nations to match ECA dollar grants) in the best way to stimulate internal recovery. Actual use will depend on the greatest need of each nation's economy. ECA will make decisions based on current economies.

Thus, United Kingdom will probably be scheduled for debt retirement; France, balancing budget and industrial reconstruction; Italy, debt retirement and industrial reconstruction; Austria, industrial expansion through investment program; Greece, balancing budget; Netherlands, balancing budget and reconstruction; Belgium, investment program; China, balancing budget; others, reconstruction.

ELECTRIC POWER PRODUCTION is a good measure of industrial progress and of recovery. Figures from United Nations show a near doubling of power production in last 10 years. UN's index, based on 100 for 1938, has reached 190 for 1948. U. S. leads in total production, followed by Canada, United Kingdom, Japan, France, Italy, Norway.

Percentage increases for various countries tell the same story of industrialization—Columbia 186%, Brazil and Chile 125%, U. S. 118%, U. K. 185%, India 85%, Mexico 65%, Belgium 42%. Palestine has quadrupled output, Austria and Poland have doubled.

TEMPTING BAIT is being dangled by Puerto Rico in front of foreign capital looking for new opportunities. Tax exemption for new industries is hoped to lure manufacturing enterprises to the island. A new law exempts 40 industries from income and property taxes until 1959 (for a few industries to 1962). Among industries so invited to a tax-free haven are glass, ceramics, pottery, soap, paint, leather tanning.

INDIA IS FORGING AHEAD on her plans to call in foreign industrial technicians to push selected projects (McG-H Digest, June, p. 10). Two teams from Koppers Co. (Pittsburgh) are working on steel and petroleum production plans. Koppers is assisted on the steel program by Arthur McKee & Co. (Ohio, U. S.) and International Construction Co. (London). Steel-production plans call for doubling India's present capacity to 2-million long tons annually. Petroleum plans are based on gasification of low-grade coal.

Items on these pages come from McGraw-Hill magazines and news services.

IT TAKES PRECISION EQUIPMENT

to make PRECISION TOOLS

P&W JIG BORER

An "open-armed welcome" greets each new P&W Jig Borer. There's pride and enthusiasm in every voice — confident smiles on the faces of operators who will use this precision machine for precision work. It's a proud day for everyone, when a new P&W Jig Borer moves into a toolroom.

YOU can't afford to gamble if you are making precision tools and fixtures. You need dependable precision machine tools that will do the job quickly and accurately *the first time.*

Precision boring is a major toolroom job that used to be a serious headache. Today it's still a major job, but the headache vanished years ago when the Pratt & Whitney Jig Borer solved the problem. The constantly improved P&W Jig Borer has been the accepted standard of precision in toolrooms ever since.

Performance and reputation are the best references for a machine tool. In hundreds of shops the P&W Jig Borer has justified its reputation for fast precision boring on jobs ranging from small drill jigs up to and beyond the large punch and die set shown here. You know at a glance the accuracy that *must* be built into a job like this. Yet it's all in the day's work for the shop that has the right precision boring equipment.

Want to see the P&W Jig Borer in action? We can tell you of a nearby installation which we can arrange for you to visit. At our own factory we can show you the exquisite precision we build into every part. Complete literature on request.

PRATT & WHITNEY

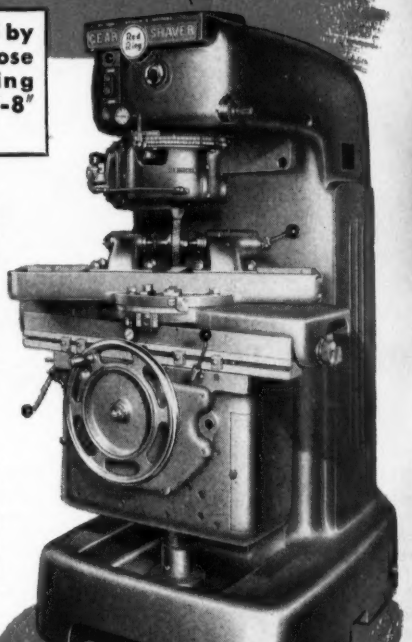
Division Niles-Bement-Pond Company

WEST HARTFORD 1, CONNECTICUT

NEW GEAR SHAVING MACHINE

Has far greater Production Possibilities

Gears may be shaved by any method you choose on the new Red Ring Universal Model GCV-8" and 12".



Conventional Shaving—You can shave wide face gears by the conventional method of shaving, that is, when the gear is reciprocated across the cutter and parallel to its axis.

Diagonal Shaving—Or, you can shave the narrower face gears diagonally at much higher production rates and with considerably less cutter wear and less effort by the operator.

Elliptoid Tooth Form—You can give the gear teeth the perfect Elliptoid form (crowning by rocking the table) while they are being shaved by either method mentioned above and without the necessity of using specially formed cutters. Special cutters may be used, however, if desired.

Taper Shaving—Likewise, gears may be taper-shaved by either the conventional or the diagonal method. This new machine is faster in operation and easier to load and unload than any of its predecessors.

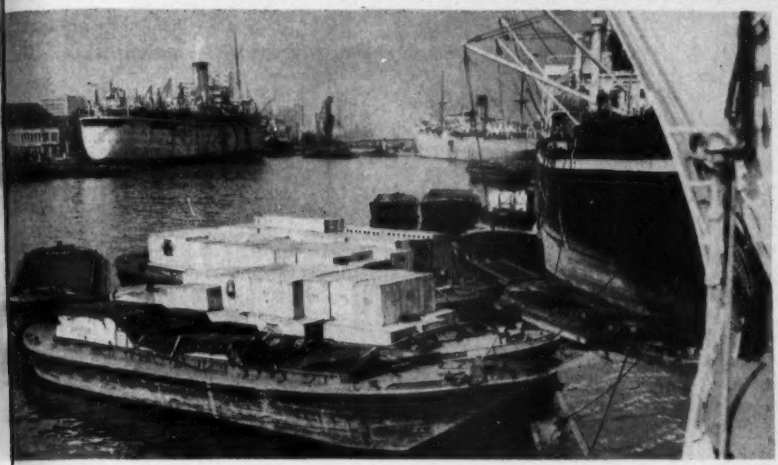
5139

Write for descriptive bulletin giving all the details of the new Red Ring Universal and its operation.

NATIONAL BROACH AND MACHINE CO.
5600 ST. JEAN • • • • • • • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

October 1948 • McGraw-Hill DIGEST • Volume 3 Number 10



ITISH EXPORTS are up 38% over 1938. They play a major role in the . . .

Outlook for British Recovery

Desperate need is for modernization of industry and conversion from consumer goods to capital goods. New industrial countries stealing markets

[Editor's Note: This is a digest of the third and final report written by James H. McGraw, Jr., President of the McGraw-Hill International Corp., during a summer tour of Europe. France and Germany were discussed in the McG-H Digest, September, pp. 16-19.]

ITISH LEADERS agree that the tempo Britain's recovery must be stepped up. t there is no agreement as to how the e should be increased. The Labor vernment has shown little sign of the ion and leadership necessary to pull country through—except for Sir Staf- d Cripps, Chancellor of the Exchequer. e Conservatives have failed to come up h a constructive program that might p.

To an outsider, five needs are clear:

1. Reduce food subsidies and cut some the new social services.

2. Overhaul the present tax system, ich is stifling initiative.

3. Free industry from unnecessary controls so that business brains can work out their own problems.

4. Get rid of restrictions in British industry through joint efforts of leaders in management, labor, and government.

5. Remove the threat of nationalization that is still hanging over privately owned and operated industries.

Charts of the Board of Trade show industrial output by mid-1948 up 40% over Jan. 1946 and 11% above the 1938 average. Export volume is rising—at mid-1948 it was 38% above 1938. But the country is still living above its income. With imports cut to minimum, income remains $600-million below what is necessary for a balanced economy. Much of Britain's sellers market is disappearing.

Industrialists blame high cost of materials on the government's bulk buying policy. They blame rising labor costs on wage increases given without guarantees of increased output. But government con-

trols get most of the blame for current conditions. These businessmen agree that no net gain would accrue from lifting entirely the controls on buying of such items in short supply, as steel and oil. But they feel easing of the controls on other items would be of help.

Failure of politicians to grasp the needs of British industry reflects the sharp cleavage between government and industry in Britain. The inclusion of British trade associations into administrative procedures in an advisory capacity was an attempt to make government controls work.

Government fiscal policies have hampered industry by discouraging productive use of private capital. Low interest rates do not draw out risk capital. Excessive taxation and the recent capital levy will soon leave the government the only source of capital for industrial development.

Inadequate depreciation rates are a reason for Britain's antiquated industry. This stems from Tory, not Laborite, legislation. The labor government's 1945 Income Tax Act started to rectify this fault. Firms can now allow 20% of the cost of new assets in the first year and smaller percentages later. If industry could, it would be spending that 20% for re-equipment but other government limitations on capital expenditures prevents the re-equipping.

A new attitude toward production is needed in both industry and labor. In the past 30 yr. British capital drained off exorbitant profits and have kept their industries from deriving full benefit from modern technical advancement. Cartel walls meant both easy profits and atrophy.

Since the war, some industrialists have plowed profits back into their businesses to the limits permitted—shortages of steel and other industrial materials preventing full-scale modernization. Some industrialists, though, still argue against modernization, saying that low-cost labor permits assured profits despite slow production methods. They also say money for new machinery now means obsolete machinery 10 yr. hence. This type of thinking is a drag on British production.

Much too heavy emphasis is placed by British industry on craftsmanship. It is time the principle of the most goods at the lowest prices to the benefit of the most people be adopted. Manufacturers say the British market does not warrant American mass-production methods. Today Britain's markets are as large as the total population of all the countries now under the European Recovery Program.

ERP offers Britain her chance to modernize on a scale never before feasible. She should produce, for the whole of western Europe, those products she can best produce.

Britain's industrial survival does not hinge so much on stepping up production in all lines but rather shifting to production of the right things—principally capital goods at the expense of consumer goods. Here are three reasons:

1. Britain grievously needs new plant and equipment to step up its own industrial productivity.

2. As formerly non-industrial countries industrialize and produce their own consumer goods, Britain faces a shrinking world market traditional to British exports. But markets for machinery, electrical equipment, vehicles, chemicals will continue.

3. These capital goods can help other ERP nations tool up for their jobs.

The next 18 months will tell whether Britain's controlled economy can meet this challenge. The future of western Europe will hinge on the outcome.

Work Simplification

To aid readers in manufacturing industries the McGraw-Hill Digest is reporting new work simplification procedures in a picture Report to Management on page 57. Complete work simplification procedure at Oldsmobile is shown step-by-step.—*The Editors.*

Records Play Six Times Longer

A whole concert on a record, instead of an album, has been made possible by development of new recording system based on slow speed and fine grooves

LONG-PLAYING (LP) phonograph records have been jointly announced by Columbia Records, Inc., and Philco Corp. The new recording system achieves six-fold increase in recording time per disk by combining 33⅓-rpm. transcription-standard turntable speed with a fine pitch of 260 grooves per in.

Decrease in turntable speed from the some standard of 78 rpm. introduces time factor of 2.35. Increase in number grooves from 85–100 per in. typical of some records provides additional factor f 2.6. Net result is that 50 min. of recording time can be accommodated on wo sides of a 12-in. disk, compared to 8 in. on the older type.

Keys to the success of the new system re use of Vinylite plastic for pressings, evelopment of lightweight reproducing rm and cartridge, and mechanical re-nements in turntable mechanism.

Grooves are about 0.003 in. wide, oughly one-third the size of the stand-rd groove. It is not possible, therefore, o record at as high a level. Recording done at about 4 db. below the usual eference. The low-noise properties of Tinylite, together with the lightweight ickup, permit a highly acceptable noise evel to be achieved while maintaining a namic range of 45 db.

The groove shape has an included ngle of 45°, and tip radius is under 0002 in. New pressings, therefore, annot be reproduced with standard 003-in. stylus. The new cartridge em-oys a balanced Rochelle-salt crystal, a w. groove pressure, and a metal stylus oped to a tip of 0.001-in. radius. Light ressure and small radius allow the tylus to follow groove satisfactorily.

Turntables thus far used are rim-riven, and care has been taken in cen-ing the inner edge of table. Use of high-grade rubber rim on idler wheel is mandatory, and its edge must be ground to nearly perfect circularity. No appreciable wow (instantaneous speed change) is discernible.

Extra care is necessary to exclude dust and other foreign matter at every stage in production of master, mother, and pressings. Results of new process are considered excellent. In frequency range, dynamic range, and distortion, LP records surpass shellac pressings and, with possible exception of noise, are better than 78-rpm. Vinylite pressings.—Electronics, S, 86

HOME-MADE DRILLING RIG

Florida Power Corp. built a drilling rig from salvaged material to clean excess slag from 19-ft. air-heater tubes without interrupting boiler operations. A 2-in. drill is mounted on one end of 20-ft. section of 1-in. extra-heavy pipe. The pipe is inserted in the gear mechanism of an old automobile differential powered by an air motor. Drill pipe is raised and lowered by electric winch. Tube ends were made accessible by cutting out 36 x 54-in. sections of air-heater top.—Elec World, Jl 31, 104

New Construction Equipment

Road Builders Association's 1948 road show pointed up a 4-way trend in equipment. Units shown are only a representative part of show's total

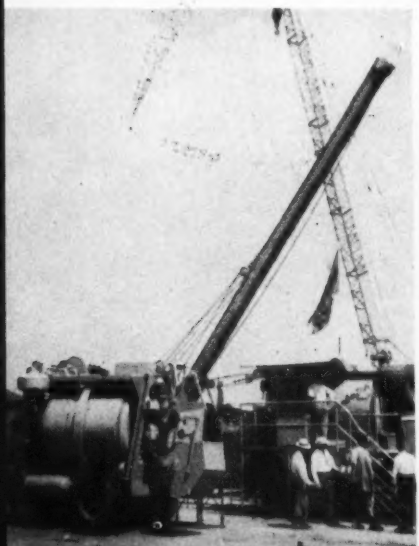
IMPROVED QUALITY and lowered costs will be reflected from new construction equipment displayed at the 1948 American Road Builders' show, held recently in Chicago. More and more equipment—bulldozers, batching plants, cranes, shovels, and pavers—are going onto rubber tires. Trend toward more precise control by hydraulic and cable systems continues, giving operator increased ease in operation coupled with better control.

A four-way trend was obvious: (1) toward bigger and bigger units, especially earthmoving, hauling, and aggregate-processing equipment; (2) in the opposite direction, smaller and smaller units, such as wheel-tractors, bulldozers, and loaders; (3) toward highly specialized machines designed to do one and only one job well; and (4) again in the opposite direction, more versatile machines with auxiliary equipment and attachments to broaden their scope of operation.

The primary purpose of all the above mentioned trends is obvious—better work with less labor. The second-mentioned trend is an attempt to reduce to a minimum hand labor operations.

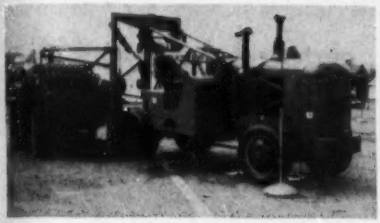
Wagnermobile's 6-wheel, 15-yd. road patrol caught many eyes. Scraper blade is mounted at 4-wheel end. Wheels at other end are hydraulically steered by torque rod and gear box. It travels at speeds up to 30 mph.

The pictures shown on these pages are by no means complete in coverage of new equipment. Of the 350 exhibits, covering 1,250,000 sq. ft., only a few pieces of equipment could be shown.—Cons Meth, Ag, 78; Eng News-Rec, Jl 29, 1

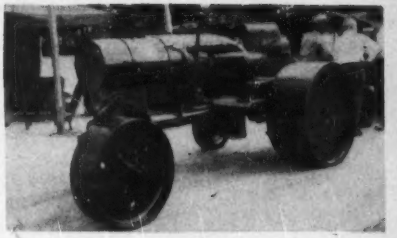


FOR SMALL ditching jobs such as utility trenches, this Barker-Greene rubber-tired ditcher excavates a 5-in. wide, 4-ft. deep trench. It is on an International chassis.

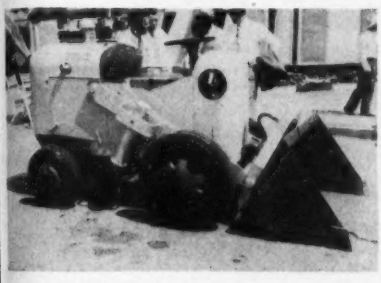
DUAL-DRUM mixer, developed by Koehring Co., is mounted on rubber. Elevating boom makes high form-placement simple.



SPECIALIZED units are typified by this Buckeye Co. highway widening roller.

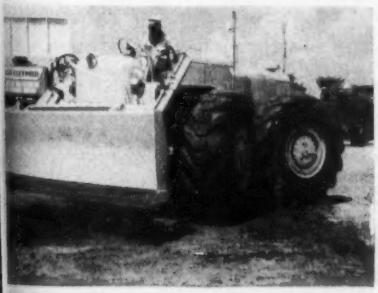


ROLLING trenches is simple with Buffalo-Springfield's off-set roller.



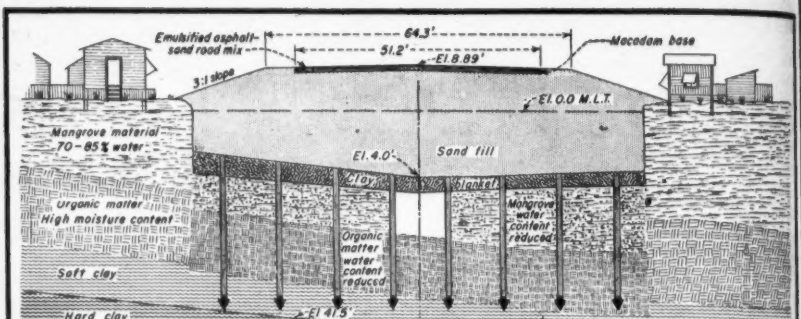
FRONT-END loaders with small capacity eliminate much hand loading. The loading bucket lifts 10½ cu. ft.

CLEANING small catchbasins is the specialized job of this midget clamshell.



TWO AXLE steering, offered on LaPlant-Choate's rubber-tired dozer, aids on sharp turns and in angle dozing.

SECOND-STORY pouring is made easier by Mixermobile's 2-yd. mixer and 1-yd. hoist bucket, mounted on rubber tires.



CROSS SECTION of the San Juan-Point Borinquen highway shows how . . .

Sand Drains Stabilize Swamp Highway Roadway

To push Puerto Rico's most important highway through a mangrove swamp along the north coast, engineers had to use sand drains to stabilize the muck-peat foundation. The 0.34-mi. strip of 4-lane highway lies between San Juan and Point Borinquen. Use of sand drains was found, by tests, to be less expensive than other methods, others being 1.8-6.0 times as costly.

A thick clay blanket was first laid along the 0.34-mi. right-of-way to exclude muck from the fill and to eliminate faulting of the embankment (see diagram above). Drains were 12-in. dia. steel pipe spaced 11.8 ft. transversely and 9.8 ft. longitudinally. They were driven as mandrels, a conical concrete point being fitted to the lower end of the mandrel. These points were left in place when sand was poured into the pipes. Pipes are 40 ft. long.

After wet sand had been placed the steel pipe was withdrawn. Sand fill was then placed 95 ft. wide across the clay blanket in 1-ft. layers.

During the first 3 mo. of operation, little settlement occurred, so a semi-permanent surface of water-bound macadam base and a road-mixed sand-asphalt top 2.2 in. thick were placed. Shoulders and slopes of sand embankment were covered with a layer of clay. —Eng News-Rec, Jl 22, 52

Colloidal Silica Aids Spinning

Colloidal silica, when used on wool and worsted yarns, gives fine, strong, loftier, more uniform yarn, the yarn being produced faster, at higher drafts.

Sytron, a silica colloid developed by Monsanto Chemical Co., reduces tendency of fibers to slide past one another in drafting by increasing inter-fiber friction. This gives better control of draft, better alignment, more uniformity in yarn, greater tensile strength.

Advantages are similar on wools or worsted yarn. With wool, 2-3% Sytron to weight of stock is added to picker, the Sytron mixing readily with the oil emulsion. On worsteds, 0.5-2% is added in the squirrel cage or gutter applicator on top at finisher gill box. In worsted emulsions, part of the water is replaced by Sytron, using 25% oil, 25% Sytron, and 50% water.—Textile World, Ag, 123

Electronics Sort Pickles

An experimental electronic sorter for grading pickle stock according to length and diameter was recently demonstrated by Buehler & Co. Two models have been designed, one having a 500-bu. daily capacity, the other a 1,000-bu. capacity.

The sorter has two units. An electronic element contains solenoid switches and transmits power to a photoelectric-cell component on the mechanical sorter. The sorter unit has a conveyor equipped with sorting stations under the electronic projectors' control to sort pickle stock to uniform size.

Sorting costs are expected to be reduced by 50% in comparison with manual sorting. A production model should be available for test within a year.—Food Ind, Ag, 124.

Faster Micro-Filming

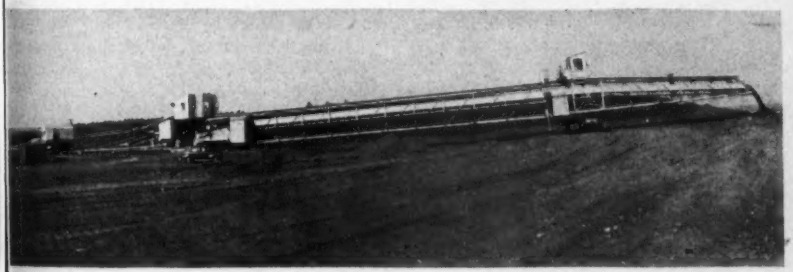
Up to 250 checks or documents can be micro-filmed per min. with Bell & Howell Co.'s new unit, getting 22,000 check-sized images on 100 ft. of film. Usable with color as well as black-and-white, unit has four major advantages: (1) only one side of the 16 mm. film is exposed, doubling number of images; (2) two rows of 8 mm. images can be recorded on the front side; (3) reduction ratio is 37:1, much greater than standard machines; and (4) automatic document-feeder enables one operator to tend two machines.

Alarm sounds if lamp fails, film is improperly loaded, receiver spool is full, or film supply is exhausted.—Business Wk, Ag 7, 39

Speeds Sewage Filtration

By restricting accumulation of growths in filters, alternating double-filtration of sewage enables settled sewage to be treated at a higher rate for a given volume of filtered medium. Sewage is treated at three times the rate of single treatment methods, according to the Water Polution Research Board, England.

Sewage is treated in four steps: primary filter, humus tank, secondary filter, second humus tank. Settled sewage is delivered to primary filter; thus a much weaker effluent is passed on to the secondary filter. Direction of flow through filters is shifted occasionally, causing film to break up and wash through the filter.—Eng News-Rec, Jl 8, 116



OVERBURDEN SPREAD BY CRAWLER CONVEYOR

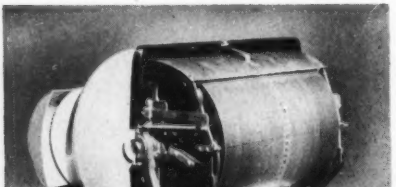
Overburden at Butler Brothers' Mesabi strip mine is handled by this crawler-mounted conveyor. Two electric motors propel treads. At far left transfer belt delivers dirt to trailing conveyor. At left center is the transfer point to the stacker. System of trailing conveyors moved overburden 5,800 ft. at first, but at end of operation will be moving it 9,831 ft. Screening plant is mounted on 21-cu. yd. shovel base with individually powered caterpillar tracks at each corner.—Eng & Min J, Ag, 70

Re-Deck Timber Bridge With Concrete Roadway

Old timber bridges on secondary highways in Alabama are being re-decked with concrete without necessitating replacement of the 4-pile bents, timber caps, or many of the stringers. Original, untreated plank flooring and guard rail were worn out. Rehabilitation has been done wihout interruption of traffic. Roadway width is 24 ft., bridge-span lengths are 15, 17, and 19 ft.

Exposed, defective stringers were replaced and stringer spacing was reduced to carry added weight of roadway. Stringers were drift-pinned and bolted to pile caps. "Steeltex" floor lathing—200-lb., single-ply kraft paper reinforced on one side by welded galvanized wire—was laid over stringers to carry the concrete deck. Paper was placed with wire in contact with stringers and tacked with 1¼-in. staples every 6 in.

No framing except for outside face of slab was used. The reinforced paper framing was completely successful, installation being simple and rapid. Deck was laid in two half-sections, decking being 24 ft. wide, 5 in. thick, and transversely reinforced.—Eng News-Rec, J 22, 68



LESSON IN DESIGN

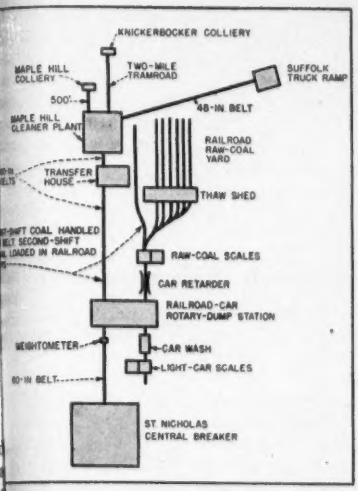
Modern design has reduced seven-piece plastic housing to three pieces in new Toledo Scale Co. Guardian 70 model and made extensive use of die-cast aluminum parts. The housing of Plaskon, a urea plastic, is designed to resist shock and stresses from thermal expansion and contraction. Price charts on both front and back are illuminated by edge-lighted acrylic plastics. Interior mechanism is sealed against dirt and shock damage to scale is reduced by using rubber to support housing on base, to mount stainless-steel molding, and to clamp housing to frame.—Prod Eng, Ag, 98

Mechanical Lap Handling

Picker laps weighing 70 lb. are produced at Columbia Mills after installation of a lap-handling monorail which eliminates almost all manual lifting and handling. Conveyor serves as temporary storage as well as reducing picker-tender's work load, reducing waste, improving sliver quality, and eliminating an elevator and an operator. All weighing operations are done mechanically, insuring delivery to the card room of only laps within weight limitations. Carriers move by gravity through picker and card room; a power system moves them from first-floor picker room to second-floor card room.—Textile World, Ag, 108

Turbojet Exhaust Not Harmful

Experiments conducted by the Navy indicate that ultrasonic noise from turbojet engine exhaust does not effect human tissue as previously believed although minor stomach and tooth ache may be experienced. Some fatigue, loss of weight, and hearing difficulty may be experienced for a short period immediately after exposure. Tests were conducted on nine men subjected to a G.E. I-16 turbojet engine over a 10-day period.—Aviation Wk, Ag 2, 28



OW OF COAL from cleaner to breaker

ater Clarification, Steady ow Raises Breaker Output

urly raw-coal capacity at Philadelphia Reading Coal & Iron Co. breakers is from 1,625 to 3,000 net tons. An ient water clarification system and cision control of raw-coal feed and d-water cones in two-course flow uit are the reason.

Rough-cleaned coal from Maple Hill aner is carried on three 60-in. belts to Nicholas breaker. First belt termi- es at transfer house where coal is er transferred to second belt or ed into cars for storage. Second belt ries coal to another belt-transfer sta- n under railroad-car rotary-dump ion. A third belt carries coal to the of the breaker.

3,000-ton-per-hr. flow is maintained ugh the weightometer, selsyn indi- rs registering the raw-coal feed rate ons per hr. Feed rate is recorded in n office as well as at rotary-dump control panel.—Coal Age, Ag, 94

Curbs Mackerel Rancidity

Storage of frozen fish can be prolonged by use of new dip-and-coat method of applying antioxidants. Mackerel fillets are dipped in a viscous coating material which acts as a carrier for antioxidant.

Material used as coating is an aqueous solution of refined Irish moss extractive (Krim-Ko-Gel). This is an effective emulsifying agent and protective colloid. Such a colloidal agent prevents formation of pockets of free oil, and the natural occurring oils in the flesh can be more readily reached by the antioxidant dispersed in water.

Among various antioxidants tried and found satisfactory are ascorbic acid, gallic acid, and NDGA-in-oil (nordihydroguaiaretic acid in cotton-seed oil). These appear to delay spoilage until the 7th or 8th month.—Food Ind, Ag, 80

Close-Tolerance Chroming

Chrome-plating of tools and gages to tolerances of 0.0002 in. is in practice at Cro-Plate Co. Tools are supplied slightly undersize; Cro-Plate plates them to exact finished size, eliminating regrinding and lapping. Ball bearings are being chrome-plated by the company in a pilot-plant operation. The plating makes balls more resistant to corrosion; they operate under wider load range; they cost less than stainless-steel bearings.—Business Wk, Jl 24, 50

Prestressed Runway at Orly

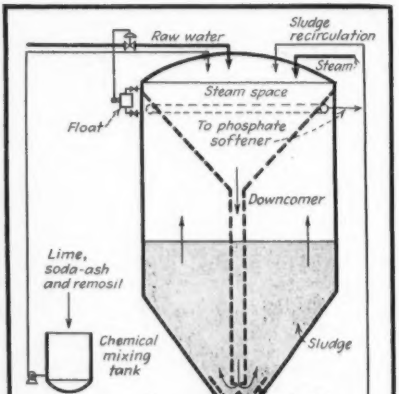
An experimental strip of prestressed concrete, 1,400x200 ft., has been laid at Orly Field, France. Engineers say the 6-in. thick strip is equal in strength to a conventional strip four times as thick. Diagonal joints at 45° angles made only transversal prestressing necessary. Meter-square concrete blocks were used in the test section because heavy equipment was not available.—Aviation Wk, Ag 2, 26

Visual Control Charts

Thousands of dollars a year are saved at Lion Mfg. Corp. by minimized production losses since the company installed machine-driven control charts. Control paperwork has been cut 85%, material shortages are virtually unknown, stock surpluses are being eliminated. One clerk now does the work of three previously.

Charts are on 32-in. x 50-yd. long graph paper, wound on feed and take-up reels. Motor-driven machine has a forward-rear gear shift; rheostat gives accurate speed control. Each chart contains 1,800 component parts.

Each week, master assembly schedules are placed on each machine, number of parts needed being shown in bar-chart form. On the machine's roll, clerk enters each shipment of component parts received in bar-chart form in the same scale as the master assembly schedule. At any time a comparison between master schedule and machine's record gives status of the unit.—Factory, Ag, 124



SLUDGE-BLANKET SOFTENER

Two years' experience by Union Bag & Paper Corp. in its Savannah plant shows superiority of Permutit sludge-blanket hot-process water softener. Raw water and chemicals, sprayed in at top, pass through a downcomer and upward through the sludge blanket. Clarified water is decanted to a phosphate softener. Results: reduction in silica carryover form 11 ppm. with conventional lime-soda softener to 2 ppm., reduction in hardness from 21 to 14 ppm., lower turbidity, less cost.—Power, Jl, 75

European Highway System

Free movement of cars, trucks, and buses through Belgium, Denmark, France, Italy, Sweden, Switzerland, The Netherlands, and Western Germany will be eased if the Economic Commission for Europe's suggestion for an international highway becomes a reality. Existing highways will be linked into the network. Standard traffic signs will be used and customs formalities at borders would be expedited.

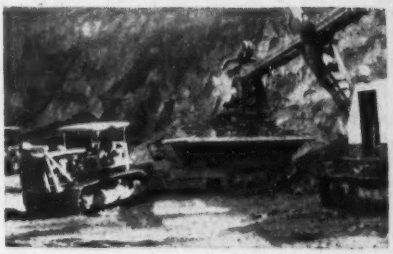
Three types of roads are proposed: a 23-ft. wide, 2-lane, unseparated roadway, two lanes of 23-ft. wide roadway separated by a central dividing strip, and a 19¾-ft. wide roadway for mountainous stretches.—Am Auto, Ag, 33

Cleans Electronic Devices

American Airlines radio overhaul base at LaGuardia Field, New York, applies solvent cleaning to aircraft and ground radio equipment. Types of gear that are spray solvent cleaned include h-f. and rhf. communications units, adf. receivers and indicators, marker, range, glide path and localizer receivers.

Spray guns have been improvised by inserting brass tubing into the end of a metal tube connected to air hose. The tubing is connected by rubber hose to a can of solvent. Compressed air flowing through the gun aspirates the solvent and feeds it as a fine mist. Work is dried by blasting with air as rubber hose is lifted from solvent.—Electronics S, 9

RUBBER-TIRED, side-dump wagons, carrying up to 45 tons of overburden, replaced . . .



CRAWLER-MOUNTED wagons at Grafton Coal Co. Wagons are part of the company's . . .

Concentrated Coal Stripping

Grafton strip mine, using lots of equipment, finds concentration pays. New wagons key to good production. Two stripping methods employed

STRIPPING AND LEVELING are done simultaneously at Grafton Coal Co., concentration of equipment being the keynote of the operation. When the strip mine was opened, management set a goal of 100 railroad cars loaded on the 100th day after ground was broken. By following the concentration principle, the goal was nearly reached.

Four shovels frequently strip simultaneously with three shovels loading coal abreast. Of great importance to Grafton's progress have been five 27- cu. yd., 40-ton, rubber-tired, side-dump wagons built at the mine. These replace crawler-type wagons pulled by tractors. New wagons are pulled by 275-hp. supercharged diesels. Tires are 30x33's. Wagons are often loaded to 45 tons, about twice the load carried by other wagons.

Stripping is along an outcropping where removal of 50 ft. of overburden uncovers a 100- to 200-ft. wide strip of Pittsburgh coal 6-9 ft. deep. Area has not been undermined. Stripping was preceded by detailed survey and exploration, bulldozers making the bulk of the strip openings, core drilling being resorted to where doubt existed.

When available, bulldozers and pans are used to remove top soil, the soil being pushed down the hill below seam level. After top soil has been removed, stripping follows one of two patterns:

(1) Lead shovel, casting as far as possible, removes overburden up to formation where shooting is required. This exposes a 35-ft. width of coal which is loaded out. Sidewall drilling to 100 ft. depth and shooting follow. Shovels then strip that width, casting as much as possible into the 35-ft. pit from which coal has been removed but leaving openings through spoil bank every 200 ft. Remaining overburden is removed by the wagons through these openings. Finished spoil is fairly level.

(2) In this method, drilling follows opening by lead shovel. The first 35-ft. width of coal is left in place, stripping of the remainder following Method I, but exposing for loading the entire width of the coal.

Side-dump wagons travel at about 8 mph. in second gear, dumping on the move. Load is 10 dippers from a 2½-yd. shovel.

It is considered poor practice to strip beyond a 60-ft. cover line when seam is under 7 ft. thick. When using the first stripping method, the 35-ft. stripped sec-

tion must be filled so when shooting is done overburden will not drive coal out sideways. Up to 10 ft. of coal can be lost by the open front.

By using wagons to haul away overburden, rehandling is eliminated, making it profitable to strip deeper. A trench 15 ft. wide and 5 ft. deep was bulldozed at the bottom of the hillside to trap rolling rock. To keep pits dry—thus loading dry coal which will pass screen easily—shovels dig sumps behind them into which water drains. Sumps are drained by portable, gasoline-powered pumps.

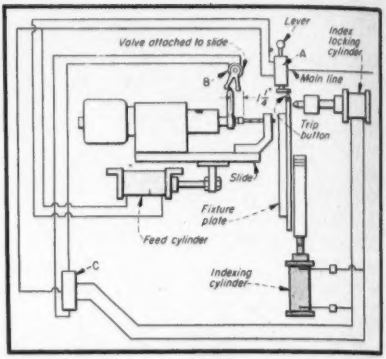
All coal is handled on seams. This permits three shovels to work abreast—the two outside shovels loading into trucks between them and the central shovel, and the third shovel loading into either truck. Trucks are end dump type. They unload on a hillside into a 600-ton-per-hr. hopper, coal falling by gravity to tipple feeders. Four trucks can dump simultaneously.

Tipple, 40 ft. wide and 150 ft. long, contains two processing lines. On each line a 600-ton-per-hr. variable-stroke feeder delivers coal to a 13.5° inclined belt 60 in. wide. Picking is done on this belt. Drag conveyor carries refuse to storage bin for future removal by truck. Cross conveyors deliver coal to trucks.—Coal Age, Ag, 84

Super-High-Pressure Canning

Research at Soviet Institute of Nutrition, Moscow, is directed to improvement in quality of canned goods. Under study is a preserving process employing pressures of 5,000-8,000 atmospheres. Under such pressures, harmful micro-organisms are entirely destroyed. This method is under investigation as a substitute for thermal sterilization.

The institute is also developing an objective method for evaluating quality of various vegetables with the object of selecting the best kinds for large-scale planting and farm cultivation.—Food Ind, Ag, 137



HYDRAULIC UNITS = HIGHER OUTPUT

Horizontal-spindle drill at International Harvester Co. machines holes in periphery of two cast-iron seed plates at a time. One hydraulic cylinder moves drillhead, another turns index wheel, a third locks index wheel in each position. Opening valve A advances drill slide and starts drill motor. Valve lever is held until one hole is drilled and fixture indexes to next hole, allowing valve A to latch. Valve B then controls machine through valve C and operation is automatic for rest of holes.—Am Mach, Ag 12, 83

Atom Power Plants in 3 Yr.

Token amounts of electric power should be coming from Brookhaven and Argonne Laboratories in the next 2 or 3 yr. if all goes well, according to the Atomic Energy Commission. Cost should be somewhere between that of hydro- and steam-generated power. Predictions are hedged by two "ifs": if the cost of uranium doesn't rise too much and force use of low-grade ore and if atomic "breeding" piles can be realized in practical engineering.

The Brookhaven pile is air-cooled, heat being picked up from the pile can be used as a power source. At Argonne the fast-neutron pile uses enriched fuel and is cooled by liquid metal. It should produce power in quantities approximating commercial plants but at a higher cost. —Business Wk, Ag 7, 23

Moisture-Proofs Cable

General Cable Corp. has developed a method of moisture-proofing its high-voltage electrical cable for shipment. All joints and seams of the shipping reel are sealed with a special plastic adhesive. Then follows a plastic sealing compound to complete waterproofing the reel's interior.

As layers of cable are reeled on, they are separated by layers of oil-saturated protective paper. A metallized cloth blanket, moisture and vapor proof, is then suspended between reel flanges and sprayed with the plastic.

The cavity under the blanket is flushed with dry nitrogen and bags of silica gel are installed. Next comes a layer of lagging over which a sheet-metal shield is placed. After another plastic seal, the final layer of lagging is applied and sealed with the plastic. Chief advantage is that the cable need not be coated with lead before shipment.—Elec World, Jl 24, 21

Electronics in Steel Mills

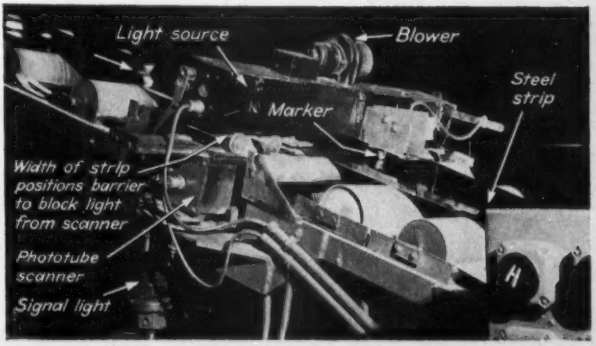
Each new use of an electronic device in a steel mill must clearly show it will perform under adverse operating conditions and either increase quality or lower costs. Among the many applications are maintaining position of a loop of steel, counting and inspecting sheets, temperature measurement, ac. to dc. conversion, and changing frequencies.

A typical application is its use in maintaining uniformity and quality of tin-plate coating. The electronic unit (see illustration) consists of a high-intensity light source above strip and a scanner underneath containing a series of phototubes. Any pinhole in the sheet lets a ray of light activate a phototube.

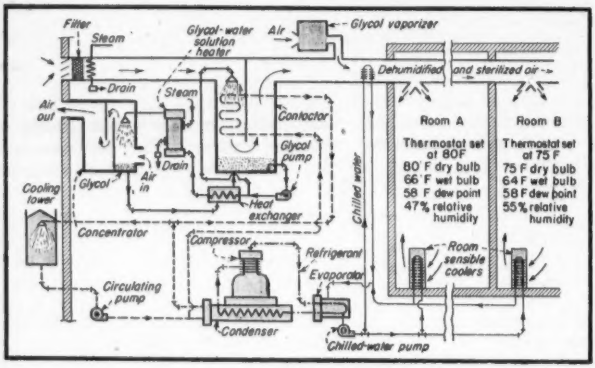
By an electronic amplifier, this energizes a marker and starts a proportional timer, which operates a gate latch that lets the defective sheet drop to the reject pile. The gate returns to position immediately so the next sheet, if perfect, can pass on to the stacker.

Another device inspects quality of tin plate. A light plays on both the moving sheet and a standard sample. A phototube is focused on both sample and work. Any diviation actuates a throw-out device.

Another typical steel-mill use is the latest type loop control, a combination of phototube bank and gas-tube rectifying unit. Only the light beam touches the moving strip, so there is no danger of scratching. As the system is free of mechanical inertia, this control holds the loop within exceptionally narrow limits. —Elec World, Ag 14, 105



DETECTING PINHOLES in tin plate is readily done with light source above sheet and phototubes below. Any light shining through pinholes energizes phototubes which operate a reject gate.



GERM-FREE AIR-CONDITIONING

Triethylene glycol (TEG) air-conditioning system provides germ-free air by introducing small amounts of TEG. Fresh air is passed through TEG absorber to control relative humidity. Part of TEG is bypassed to heater and through concentrator to raise temperature above vapor-pressure equalization point and remove moisture from TEG.—Oper Eng, J1, 42

Paint Retards Fire

Requirements for fire-retardant paints are met in several ways, depending on the materials used in them. Water glass and silicon ester paints do not support combustion. Paints containing magnesium sulphate, borax, boric acid, and sodium phosphate melt at high temperatures to form protective coatings. Paints containing chlorine, ammonia, carbon dioxide, and sulphur dioxide decompose and give off gases that smother the flame.

Latest development is the phosphate resin aqueous emulsion paint, which has the ability to extinguish flames. When exposed to flame, it puffs up to form a heavy, sponge-like insulating mat. This cellular mat completely excludes oxygen and prevents the underlying surface from burning. It thus prevents flash fires and retards the spread of flame. —Prod Eng, Ag, 140

Plexiglas II for Planes

Higher-speed aircraft have demanded a blister and canopy material that will withstand higher service temperature—up to 140° F. Plexiglas II, made by Rohm & Haas Co., is the answer. Already installed on *Phantoms* and *Banshees*, it withstands temperatures 36° F. higher than the original Plexiglas.

It can be sanded, sawed, ripped, routed, and polished. It is formed by standard methods, heating ovens being kept 36° hotter than standard practice. Tensile strength is 9,000 psi., 1,000 psi. stronger than its counterpart. — Aviation Wk, Ag 9, 30

Earthquake Protection

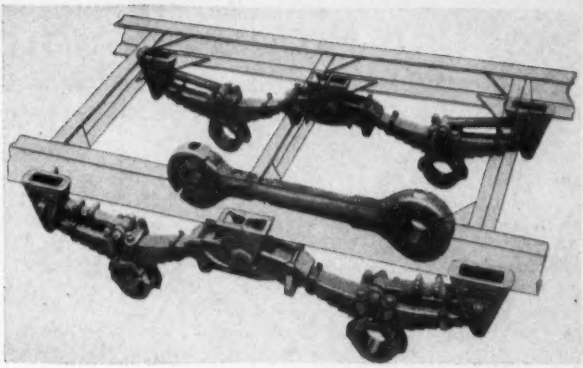
Power-plant design in earthquake areas should afford means to overcome some elements in the swaying motion of an earthquake. The Los Angeles Dept. of Water & Power provided such protection by lowering center of gravity of turbines to assure uninterrupted operation.

This lowering was accomplished by triangulating the forces with two main condensers and a connecting piece to split the steam flow. The latter is a bulky welded steel structure having vanes welded inside that act as turning points to give a centrifugal motion to the steam. This causes it to return more rapidly to the liquid state in the condensers.

The vanes were built-up of special hull plate, made necessary by extreme service requirements. Each hour about 575,000 lb. of water and steam flow through the connecting piece.—Power, Ag, 71

TANDEM AXLE GEAR

Designed to be welded to frame of truck trailers, the unit has leaf spring suspension for two axles and a torque arm placed between axles. The telescoping torque arm prevents brake torque from passing into springs, so forces from brake on one axle are absorbed in that axle's suspension. Standard Forge & Axle Co. unit prevents wheel bounce and brake chatter.—Prod Eng, Ag, 96



Reheating Revives

Originally applied to reduce turbine-exhaust moisture with limited throttle temperatures at high pressures, the reheating cycle again is seriously considered for new steam-turbine installations. The reason—high fuel costs.

Estimates indicates that gain in economy by reheat varies from 4-6%. The thermal gain may more than offset additional cost and complicating factors. One early objection was that the large volume of steam entrained in reheat lines might cause over-speeding with load loss. Today, reheat turbines have intercepting valves under control of the main speed governors.

As there is a definite trend toward use of the single-boiler, single-turbine arrangement, many former objections to the reheat cycle are voided. Such a setup affords minimum complications to its use.—Power, Ag, 99

Reduces Picker-Room Fires

Fire prevention and more efficient manufacturing result from installation of humidification systems in opener-picker departments, according to Factory Mutual Fire Insurance Co. Density, angle, and surrounding air movement have little influence on ignition of fibers; moisture content is the most important factor in ignition, although all four factors govern spread.

In mills having humidification systems fire frequency was only 39% of average at all mills; average damage was only 35% of the over-all average.—Textile World, Ag, 110

Wirebound Crates Save 66%

Cost per crate has been reduced $2.14, with additional intangible savings, at Red Star Products Co. since wirebound crates replaced lumber crates for shipment of saws. Previously two men could construct only 20 crates per day; now 20 crates are prepared in a matter of minutes.

Crating is received completely fabricated from the manufacturer. Wirebound sides are in one piece, folded to conserve storage space. Saw is placed by crane on tailor-made crate base and bolted down. One man folds sides around base, positioning it so end cleats engage and support base. Five binding wires are twisted by a special tool; then top is affixed.

Crates are sufficiently strong to permit stacking of 465-lb. saws without danger of collapse.—Factory, Ag, 76

Lighting Progress in Stores

New concepts of retail-store lighting, recently introduced in a new department store, are expected to influence future electrical construction

LIGHTING IN RETAIL STORES has a tremendous bearing on the psychology of selling. It influences environment, contributes to cheerfulness. But when lights go out, business goes with them. So a new trend in wiring of large department stores is appearing—dual distribution which offers a practical and economical method of assuring reliable continuity.

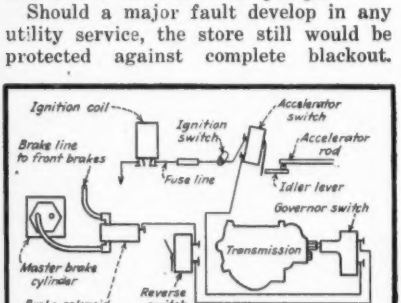
Foley's new $12-million windowless store in Houston, Texas, has been completely equipped with dual distribution. Each main switchboard is divided into two sections serving separate feeders. Alternate lights on all floors are connected to separate circuits, and this same division is continued to all motors connected with elevators and pumps.

Should a major fault develop in any utility service, the store still would be protected against complete blackout. Half the electrical facilities would continue to operate. Another advantage attained from dual distribution is that half the lights can be turned out from the basement control center.

Foley's also employs a recently developed system whereby the space of the entire furred ceiling below the floor acts as the raceway for routing wires to floor outlets. Access into the ceiling is provided at six locations in each bay of the selling areas through readily removable built-in lighting units.

This system permitted utilization of a unique construction feature in the upper floors. Finishes, such as linoleum, asphalt tile and carpeting, are applied directly to tops of arches of the concrete joist construction, without any fill being employed. This method reduced building construction costs and lessened dead loads on framing, columns, and footings.

The lighting plan itself employs both fluorescent and incandescent sources to achieve general diffusion. Blending incandescent predominance of reds and yellows with blue-green-violet of fluorescent gives color balance and minimizes glare and eye fatigue. For show-case displays, decorative effects, and concentrated intensities in some areas, the lighting includes fluorescent coves, recessed downlights, and directional spots. —Elec C&M, Ag, 49



HOLDS CAR ON HILL

Newly developed hill-holder, manufactured by Weis Brake Control Co., Inc., locks brakes on stopped cars with hydraulic shift transmissions. With ignition switch on, accelerator pedal released and brake pedal depressed, a closed circuit from ignition switch to governor switch energizes a solenoid valve. This valve closes and prevents return of front-wheel brake fluid to master cylinder, thus keeping front brakes engaged. Holder is released by depressing accelerator pedal to open circuit at accelerator switch, deenergizing solenoid valve.—Prod Eng, Ag, 152

Mobile Transformers

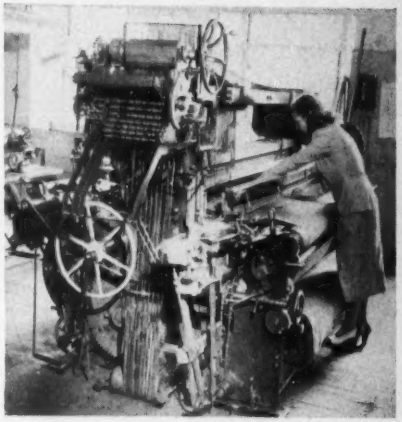
Portable substations, mounted on trailers, are used by Western Construction Corp. to step down 33,000-volt commercial current to 4,100-volt current for electric power shovels. Stations can be moved to follow shovels in pits and keep low-voltage line down to 2,000 ft. to reduce line loss.—Cons Meth, Ag, 77

Coyote-Drift Blasting Used in Glory-Hole Mine

By adapting coyote-drift heavy blasting to glory-hole mining, Ruby Gulch Mining Co. supplied ore for winter operation during warm weather. Over a year's supply of ore for gravity drawing was obtained at a cost of $0.0546 per ton. Increased production at the mine cut operating costs below $1.60 per ton.

Coyote-drift blasting was done well up on the face of a cliff instead of at the toe. A 35-ft. cross-cut in west face of glory-hole was used as a starting point. crosscut being driven until face was 60-65 ft. back of the pit. Drift was driven 142 ft. from the end of a crosscut roughly parallel to one wall of the hole.

Five equally spaced charges of Nitramon were used for blasting, the two end charges being 60% heavier than the three center charges. Almost all ore broken could be moved by gravity drawing, the breakdown and cut being at a −45° angle to the cliff.—Eng & Min J, Ag, 75



LOOM FEATURES WIDE SPEED RANGE

Variable-speed control on the new Coastal Machine Works wool or worsted loom permits loom to run as slow as 90 picks per min. or as fast as 160 ppm. without adjustments. Range of fabrics woven is from light tropical worsteds to overcoating. Loomsides are steel plate, frames and girts being welded to loomside for added strength. A new shuttle check —a piece of leather forced through a friction clamp—absorbs force of the shuttle.—Textile World, Ag, 139

New Mercury Power Plant

First of two, 7,500-kw. mercury boiler-turbine units will begin operation this year for Public Service Co. of New Hampshire. Total installation will have two 7,500-kw., 1,200-rpm. mercury turbines with individual condenser-boilers that supply 600-psi., 825° F. steam to a 25,000-kw., 3,600-rpm. steam turbine.

The steam turbine will normally be fed by both mercury units, but will be able to operate at part load with either mercury unit out of service. Most of the heat transfer to mercury will occur in the vapor stage, following successful experience at the plant at Kearney, New Jersey. Boiler heat release will be low compared to conventional steam practice.

Mercury pressure below 150 psi. represents no great change from Kearney, but higher steam conditions promise appreciably better over-all plant efficiency. Condenser-boilers will work on a 30° F. temperature differential which will simplify water-treatment problems.—Elec World, Jl 17, 71

Two-Tone Plating

Continental Die Casting Corp. has developed a process to mass-produce single die-casting with both gold- and chrome-plated finishes. Casting is bathed in a copper bath, then in a nickel bath to protect against corrosion. A plastic coating is bridged across the area to be gold-plated. Casting is then chrome-plated and the masking removed prior to gold-plating. Finally gold-plated area is sprayed with enamel and baked for an hour.—Business Wk, Ag 7, 34

High-Speed Counter for High-Speed Machines

A high-speed revolution counter that does not attach to rotating shaft or load has been developed at Douglas Aircraft Co. for determining speed of engine-driven cabin superchargers. The idea can be applied to turbines and other rotary-blade machinery.

The counter consists of three items: (1) pickup, (2) capacitance transducer, and (3) electronic frequency meter or tachometer. The pickup is made of one or more insulated vanes located adjacent to rotary shaft or attached blades so as to vary its capacitance to ground with shaft rotation. The transducer supplies an alternating current, the frequency of which is proportional to shaft revolutions per minute.

The current from transducer is applied to a frequency meter or tachometer, either of which has a scale calibrated in rpm. A frequency meter is preferred when speed of many-bladed devices is to be measured.—Electronics, S, 80

Relayout Done on Weekends

Changes in production-line layout at Mack Truck engine plant, International-Plainfield Motor Co., are made on Saturday and Sunday. Extensive prior planning offsets time-and-a-half paid to maintenance personnel. Relayout plans originate with the plant superintendent when he finds new production requirements to be met the following week. A new layout plan and an itemized list of machines and equipment to be moved are given to plant engineer by the plant superintendent. From them he plans in what sequence moves will be made.

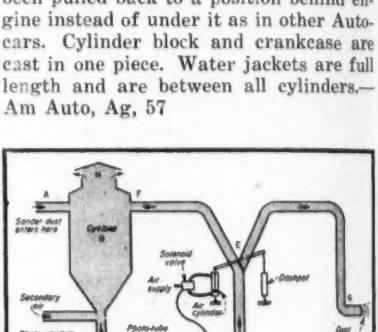
No later than Thursday the department effected is checked and existing location of units marked on the new layout plan. Route for each move is plotted and numbered. The following day the complete plan is checked by the foreman of the moving gang, who selects crew and necessary equipment to complete the operation.

All accessory equipment is installed before the plant closes Friday.—Factory, Ag, 92

Autocar Adds Two Models

Autocar Co. has added two more trucks to its line. The C95T is rated at 65,000-lb. gross train weight; the C75T is rated at 55,000 lb. Both vehicles can be used as tractor or, with a longer wheelbase, as a truck.

In the new models, the front axle has been pulled back to a position behind engine instead of under it as in other Autocars. Cylinder block and crankcase are cast in one piece. Water jackets are full length and are between all cylinders.—Am Auto, Ag, 57



BURNS SANDER DUST

Sander dust in woodworking plants is hard to handle, but method shown handles, stores, and burns dust satisfactorily. Solids from dust entering at A separate out in cyclone B, fall to bottom, and are drawn through pipe C by blower D. Dust passes through valve E either back to cyclone at F or to burner G. Valve E is controlled, through an air-cylinder setup, by solenoid valve actuated by photo-electric relay systems. When dust is insufficient to form proper burning mixture, valve E is operated to recirculate dust through cyclone. When its density increases, valve E then feeds it to burner.—Oper Eng, Ag, 24

Circular-Rib Machine for Women's Underwear

Permanent shape is knitted into women's vests and panties with Mellor-Bromley's circular-rib knitting machines. A wide range of design is possible with rack model. Model RLG 7 uses eight feeds and is fitted with two patented geometric needle-selection units which permit tuck-and-clear or tuck-and-miss patterns.

Two courses of the design are produced in each revolution with separate selection of cylinder needles for each course. The geometric-jacquard needle-selection unit is small, pattern changing costs merely being labor involved. It produces 1x1 rib.

The RLG 8 produces similar garment in 2x2 rib. Stitch changes are automatic, stitch length being controlled by a ring with lever connections. Wool, cotton, rayon, or mixtures can be knitted on either model in counts ranging from 20s to 30s worsted or their equivalents.

The RLGT/2 rib-transfer machine is for higher quality garments than the other machines. Designed with four feeds and two loop-transfer positions, knitter has four selection units.—Textile World, Ag, 118

Dielectric Heating of Films

Thin films present several problems in dielectric heating, the principal one being limitations imposed by air gaps. This may be avoided by causing longitudinal currents by the stray-field method.

Design of electrodes can accomplish this result. They are arranged so electrodes of opposite polarity are adjacent to each other along the film to be heated or on opposite sides of it. While such arrangement does not eliminate disadvantages of maintaining an air gap, it does permit a wider margin of safety between required plate-to-plate voltage and the minimum breakdown voltage of the structure.—Electronics, Ag, 83

DRAG CHAIN EASES TRUCKING

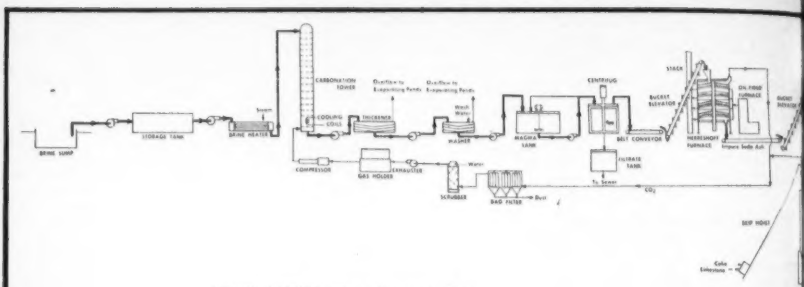
Allis-Chalmers Mfg. Co. has installed drag-chain conveyors in its Springfield Works for moving 3 x 4-ft. wagons along shop aisles. The wagons have drawbars that can be drawn by hand. Chain travels at 10 fpm. and wagons can be engaged or disengaged without danger. The track is set into the floor so trucks can move across chain without interference.—Am Mach, Jl 29, 102

Solvent Extraction of Vegetable Oils

Solvent extraction of soybean oil is well established, but in processing of other oil-bearing materials it is still in its infancy. To give full benefit from replacement of older mechanical methods, equipment will have to be simplified to lower operating costs and reduce labor requirements.

Allis-Chalmers has developed a unique application of continuous solvent extraction—extracting fish oil from full-fat herring meal. The new unit will be erected at Reykjavik, Iceland. The oil will go to Europe for margarine.

Other advancements: Progress is being made on extraction of oil from corn germ and flaxseed expeller cake. A new method is the use of centrifugal machinery for processing high-oil-content seeds such as castor beans. Within the past year four big solvent-extraction plants have started commercial production of cottonseed oil.—Chem Eng, Ag, 99



FLOW CHART – Sosa Texcoco, S.A.
Soda Ash and Caustic Soda

New Soda-Ash Processing Plant

Mexico's newest and biggest alkali plant will supply about 30% of its needs for soda ash and caustic. Resources and climate shape process

LOCATED some 20 mi. from Mexico City, the new plant of Sosa Texcoco, S. A., produces soda ash and 50% caustic from the brines of Lake Texcoco. Designed and built by Chemical Construction Corp., the $2.5-million plant will produce 100 tons a day of soda ash, of which part will be used for 30 tons per day of the caustic.

Process, layout, and design have been influenced by local conditions. Availability of natural brine; the hot, dry climate; and the jelly-like consistency of the subsoil have all had their effect. For instance, all the plant equipment is located on concrete mats.

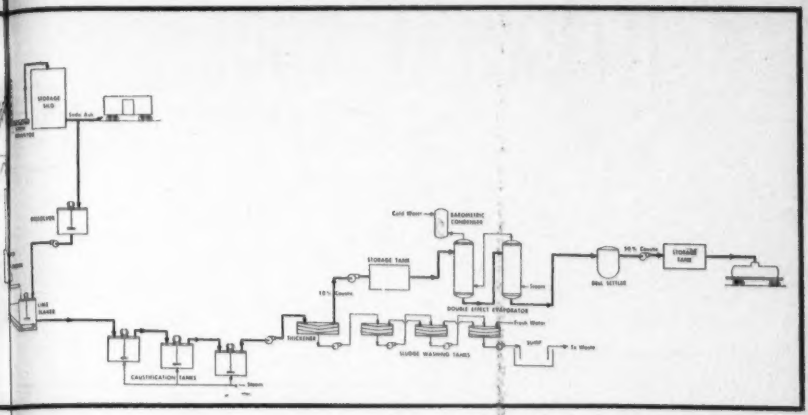
Reason for the plant's location is the salt deposit of Lake Texcoco, partially uncovered as the lake's level has lowered. Work begun in the 1600's and completed in 1900, to provide land for expanding Mexico City, lowered water level 25 ft. and reduced lake area to one-tenth its original size.

To make the land tillable, the salt-impregnated top soil is washed with fresh water. The weak brine formed in washing is concentrated in a huge solar evaporator, called a caracol, that covers 2,000 acres. Built as an inward spiral, the caracol is sectioned, with liquid flow controlled by weirs. Operation is continuous at 10-million gpd.

Concentrated brine (about 20% salts) flows from the caracol to the alkali plant through a 2-mi. canal. Brine first enters a sump, 20 ft. in dia., then is pumped to two 190,000-gal. storage tanks. From these tanks, it is pumped with self-priming pumps through spiral preheaters which heat it to 50° C. with steam.

It then is fed to carbonating towers, 6 ft. in dia. and 100 ft. high, in which it is carbonated by carbon dioxide to sodium bicarbonate. Cooling coils precipitate the bicarbonate. The slurry is thickened in a Dorr thickner, washed with water, and pumped to the centrifuges.

Eight Tolhurst centrifuges, all of suspended basket type, are fed from a looped system built around a magma



tank. Slurry is pumped continuously from this tank, through the feed line, and back to the tank.

The solid bicarbonate cake from the centrifuges is conveyed to the top of dryers, two Herreshoff furnaces 16 ft. in dia. and containing eight hearths. They are muffle type to recover carbon dioxide given off as bicarbonate reverts to the carbonate, soda ash. Heat is supplied by external oil-fired furnaces.

As the soda ash still contains traces of bicarbonate and organic impurities, and is not of proper density, it is now calcined. The two calcining furnaces are direct-fired Herreshoffs having six hearths and operating at 500° C. The resulting white, dense soda ash is conveyed to storage silos and then part of it to shipping.

The rest of the soda ash is automatically weighed into a dissolver, then pumped to the lime slaker. Water sources for the dissolver are wash liquors from caustic-sludge washing system and fresh makeup water.

Lime for the slaker is produced in two 11-ft. dia., 40-ft. high intermittent-feed kilns. Burned lime is conveyed to a crusher for sizing. In the slaker, lime and soda-ash solution meet. Liquid overflow goes to caustifying tanks in which direct steam addition causes reaction, resulting in 10% caustic.

The slurry is pumped to a Dorr thickener, from which clear 10% caustic liquor is pumped to storage tanks. Sludge from the thickner still contains valuable caustic soda and is therefore washed. Final sludge goes to waste, while wash liquors are fed back to the slaker.

The 10% caustic solution is concentrated in a double-effect Swenson evaporator system. These evaporators have liquid circulation around the tubes. The caustic, now 50%, goes to a bell settler where salts are removed, then to storage tanks from which it is loaded into trucks or tank cars.

The carbon dioxide, needed for carbonating, is produced in dryers and lime kilns. It passes through filters for removal of carried-over solids, then through water scrubbers for final solids removal and cooling. An exhauster sends the carbon dioxide to a gas holder, from which it is compressed and fed to the carbonating towers.

The compressors, four in number, are driven by 250-psig. steam and exhaust at 20 psig. The low-pressure steam is used for heating incoming brine and for steam addition to the caustification tanks.—Chem Eng, Ag, 96, 136

TECHNICAL SHORTS

Rock Fill Diverts River—Rock fill and scrap steel diverted the Colorado River in just 56 hr. of filling. Slotted timber trestle was built across the river, a quarry being located at each end. A fleet of bottom-dump trucks shuttled across, dumping a load each trip. After 36 hr. only a 40-ft. channel remained at the center of the river, but current was so strong that even the largest rock was swept away. A scrap steel framework was placed in the gap on the upstream face to reduce rush of water. This permitted filling the last 40 ft.—Eng News-Rec, Ag 5, 70

Plastics Invade the Arts—Hotel Sheraton, New York, is displaying luminous murals made of acrylic plastic sheets which "pipe" light from edge to edge. Decorative effects etched into the front surface glow against the opaque background from light entering through edge of plastic panel.—Elec C&M, Ag, 118

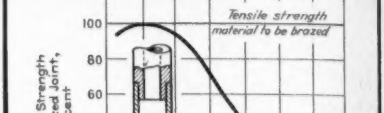
New-type Wind Tunnel—Utilizing boundary layer control, a new-type wind tunnel being constructed at the University of Southern California is designed for lab experiments in turbulence, velocity distribution, flow inclinations, pressure losses, and other fluid mechanics and aerodynamic problems.—Aviation Wk, Ag 2, 14

Sprayed Wheat, More Protein—An increase in protein content of wheat from fields treated with 2, 4-D has been noted. All varieties of wheat showed increase, regardless of whether grain or straw yields were increased or decreased.—Food Ind, Ag, W68

Sweating Rock Bits—Reed Roller Bit Co. sweats granular tungsten carbide on rock-bit teeth to give them wear-resistant case. Bits are prepared by painting with water glass which serves as binder to retain carbide particles.—Weld Eng, Ag, 40

Looking Backward—An operator of many fleets of heavy vehicles has spent $1-million in research work on a suitable steam power plant to replace internal combustion engines now in use. High fuel cost is one of many reasons for the program.—Am Mach, Ag 12, 77

Investigates Bearing Alloys—The Tribophysics Section of the Australian Council for Scientific and Industrial Research reports that tests indicate that hard crystallites in a soft-base matrix contribute little to frictional and wear properties. They do impart superior mechanical and physical properties to alloys under running conditions.—Prod Eng, Ag, 151



SILVER-BRAZING CLEARANCES

Strength of silver-brazed joints depends on clearance allowances between parts. Clearances too small prevent silver alloy from filling the space properly, while larger clearances cause joint strength to drop, as the gap increases, until it reaches tensile strength of the brazing alloy. As the chart shows, a proper fit makes joint as strong as material being brazed.—Prod Eng, Ag, 109

Rubber Saves Bushings—The three hinge pins on Hanna Coal Co.'s 40-yd dippers are cushioned by special 4½-in. long rubber-lined steel bushings. The rubber lining, both inside and out, has reduced pin shearing greatly. Inside lining is ⅝ in. thick, outer one ⅞ in. thick. Rubber is bonded to bushings.—Coal Age, Ag, 120

Scrap Pays a Profit—Metal chips and scrap at Woodward Governor Co. are paying an extra profit. Scrap is sorted and classified to bring top prices. Cutting oil is drained off and part of it reclaimed. Remainder is not sold but burned as heating oil. Fuel bills have been cut 30%.—Factory, Ag, 74

Sprays Condenser—When ammonia-compressor head pressure climbed past 230 psi. and tower cooling water could not handle the load, Genesee Brewing Co. rigged sprayers over compressors. Emergency spray of 72° F. city water kept pressure under 220 psi. and the plant operating.—Oper Eng, Ag, 36

Bright Light—The New York International Airport in its all-weather landing light installation has a krypton lamp which, at peak operation, flashes with a brilliance of 9-million candlepower per sq. in. This is nine times the sun's intensity within the earth's atmosphere.—Elec World, Jl 24, 3

Holds Mine Cars—Mine-car stops at shaft stations in New Park Mining Co.'s mine are made safer by use of a chain block. One end of chain is fixed by bolt to a steel plate or wooden sleeper, and the loose end fits into a slotted steel angle across the rail. Chain is removed only after hoisting cage is in position to receive loaded or empty cars.—Eng & Min J, Ag, 105

Tangled Yarn Creel—To run off bobbins of tangled yarn, twisting spindles on which tangled bobbins are placed are supported by sections of a booster rail. Creel supports are ¼ x 2-in. bar stock held by a 2 x 2-in. timber. A section of a timber bolster is bolted to creel supports on both sides of frame. Twisting spindles are bolted in place in these rail sections and tangled bobbins placed on spindles.—Textile World, Ag, 15

Colored Templets—Lines on metal templets and master layouts can be made more distinct by applying paints of contrasting colors to the metal in successive layers. Scribing lines through outer layer (white) causes them to stand out in clear relief from color (black) of undercoat. Third color can be added by covering with water-soluble compound, scribing, lacquering, and washing.—Prod Eng, Ag, 124

Dredge Carried Big Stick—A 242-ft. long boom weighing 40 tons has replaced a shorter, lighter boom on one of Olympian Dredge Co.'s bucket-type dredges. Boom is 24-in. square, assembled in four pieces and put together with three scarfs 26 ft. long.—Cons Meth, Ag, 76

High-temperature Alloys—Research is directed to alloys of sodium, potassium, and bismuth to find alloys capable of withstanding high heat ranges in future atomic power plants. These metals have low nuclear cross-sections, permitting free passage of neutrons. —Chem Eng, Ag, 78

Cars Change as Belt Runs—A double-hopper belt-to-car transfer unit at Lorado Coal Mining Co. permits continuous running of belt while cars are being changed. Unit was built in mine shops. Hoppers are 80 in. long, 54 in. wide, and 12 in. high—car height and width being determining factors on hopper. A 12-in. clearance is needed between belthead and top of car.—Coal Age, Ag, 116

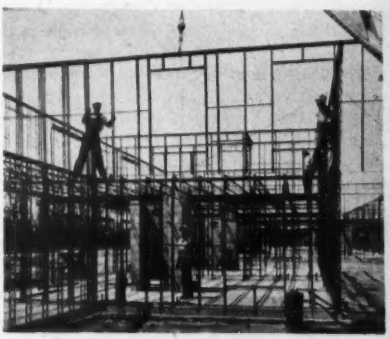
Reduces Potato-chip Oil—Treatment of potato chips with hot 7.5% sodium chloride solution before frying reduces oil uptake as compared with hot-water treatment. In commercial use, potato slices should be well agitated during 2-min. treatment at 185° F. Temperature of bath should be maintained throughout treatment.—Food Ind, Ag, 96

Discover Sub-atomic Particles—Fourteen new particles, identified as "varitrons", were discovered in cosmic rays by two Armenian scientists in studies conducted since 1942 on Mount Alagez in Soviet Armenia. Electron masses of particles ranged from 100 to 25,000. —Nucleonics, Ag, 66

Spring Bumpers Open Doors—Harnischefeger Corp. has placed spring bumpers on all double swinging doors to speed intra-plant truck movement. Driver merely hits bumper and drives through. Driving is no longer stop-and-go; man to open door has been relieved. —Factory, Ag, 128

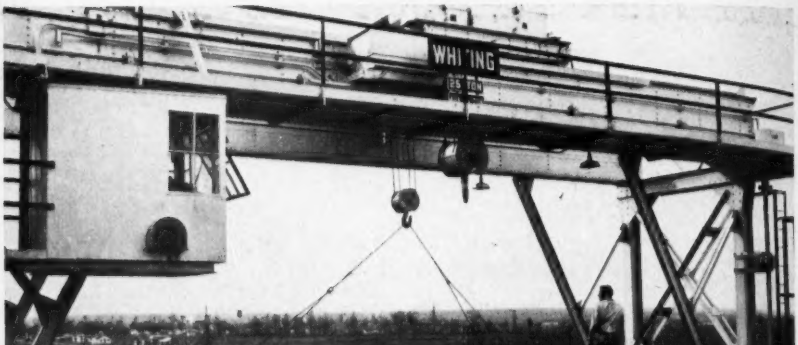
Limits the Lift—Liberal use of ⅛- and ½-ton jib cranes at Reliance Electric & Engineering Co. has cut fatigue and injury and increased production. Any job calling for more than a 10-lb. lift can be handled by one of the 69 cranes in the shop—Am Mach, Jl 29, 101

Evaluates Insecticide Dispersal—Research workers of U. S. Army Chemical Corps have developed method to evaluate insecticide dispersal in the field. By adding minute amounts of radioactive manganese to insecticide, 0.001 lb. of DDT per acre of ground can be detected by Geiger counters.—Chem Eng, Ag, 126



SAVES 50% OVER MASONRY

These prefabricated steel wall frames and floor joists save 50% over masonry and fire-resistive construction on a 12-family apartment project in Wisconsin. Frames and floor joists are arc welded and panels are attached at the site by the same method. Modular design—in 2-ft. increments—permitted controlled shop fabrication. Open-web expanded steel studs are welded between channel caps and sill plate. A ¾-in. channel between studs gives added horizontal bracing.—Eng News-Rec, Jl 22, 38



CECIL LYNCH STATION at Little Rock, Arkansas, is a semi-outdoor plant with outdoor boiler and low turbine room. Overhead crane lifts off roof hatches for maintenance.

Outdoor Plants Practical

Investment savings in outdoor power plants are especially important in these days of high construction costs. More plants designed as such

REDUCING COSTS in power-plant construction is especially important now because of the large amount of new capacity being built. Outdoor and semi-outdoor construction of steam plants offers substantial reductions in capital investment. Advantages, when cost is considered, outweigh disadvantages of maintenance and operation problems.

Seventeen such plants are now in operation in the U. S., with 47 more under design or construction. These fall into three groups:

(1) Steam-generator, airheater, and draft fans are outdoors. Approximate investment saving is $3 per kw.

(2) Customary full turbine room is eliminated, the turbine-generator being on open deck protected by removable housing or low permanent housing with removable roof hatches. Saving is about $6 per kw.

(3) All housing for turbine-generator is eliminated; condenser and other auxiliary equipment are outside, leaving only control room and delicate apparatus enclosed. Saving is about $10 per kw.

Projected plants in groups 2 and 3 far outnumber those in group 1, marking a definite trend toward outdoor types with more than just the boiler outdoors. Climatic conditions are important, but all types are being extended northward.

Operating experience in existing stations indicate that outdoor features need not compromise with service reliability. Because of metallurgical and design progress, availability of boilers, turbines, and auxiliaries is now high. Emergency shutdowns are therefore fewer and major maintenance is now scheduled at longer intervals than formerly. Thus, there is less risk of loss in production.

For plants located where temperatures below 32° F. are common, freezing of lines is the most prominent hazard to

service reliability. Most situations can be corrected by covering with steam or electric tracing.

Also desirable is construction of a windbreak adjacent to the boiler. The heat radiated from the boiler casing holds ambient temperatures between boiler and windbreak above freezing, even in moderately cold weather. A tarpaulin properly supported may be ample protection, or permanent hooks for hanging canvas panels may be welded to frame work of boiler.

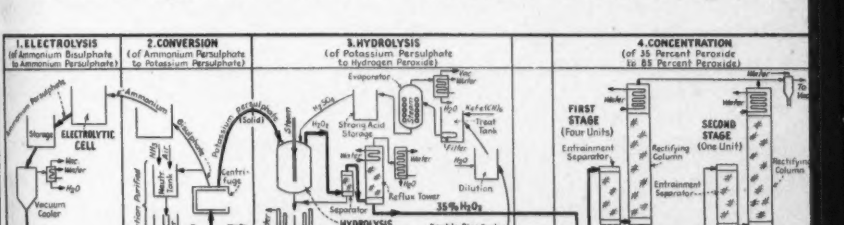
Equipment may need some modification for outdoor service, but cost is small compared with that of housing. Plant design also changes, plants being more compact and lending themselves to employment of small operating forces. Placing boiler and turbine controls close together in a common control room is favored by operators.

The most serious consideration governing outdoor features is possible delay in completing scheduled or emergency maintenance. Experience to date in existing plants indicates that extra maintenance cost and loss in production are insignificant when compared with savings made possible by outdoor construction. Maintenance work is admittedly somewhat more difficult, but can be eased considerably by temporary shelters.—Elec World, Ag 14, 93

First Indian Plane Proposed

India's first native-designed personal plane, the *Meghdoot*, will be a 2- or 3-place, enclosed-cabin, fixed gear craft. Its developers believe the plane will tap the local demand for training planes now that importation of U. S.-made personal planes has been banned. Plane wing spread will be 28 ft. 10 in.; length will be 22¼ ft. The 130- to 140-hp. engine will power the plane at a cruising speed of 125 mph.; plane will land at 25 mph.

Plans call for a spruce frame prototype with birch sheathing for initial tests. Final plane will be of all-metal construction.—Aviation Wk, Ag 2, 30


1. ELECTROLYSIS (of Ammonium Bisulphate to Ammonium Persulphate)
2. CONVERSION (of Ammonium Persulphate to Potassium Persulphate)
3. HYDROLYSIS (of Potassium Persulphate to Hydrogen Peroxide)
4. CONCENTRATION (of 35 Percent Peroxide to 85 Percent Peroxide)
ELECTROLYTIC CELL
CONVERTER
HYDROLYSIS RETORT
FIRST STAGE (Four Units)
SECOND STAGE (One Unit)
PRODUCT 80-85%

HOW GERMANS MADE HIGH-TEST H_2O_2

German hydrogen peroxide industry was based on well known Pietch-Adolph potassium persulphate process of producing 35% H_2O_2 and an unusual 2-stage distillation process for concentrating to 85%. First includes (1) electrolysis of ammonium bisulphate to get ammonium persulphate, (2) conversion to potassium persulphate by adding potassium bisulphate, and (3) hydrolysis to produce potassium bisulphate and H_2O_2, the latter being vaporized and rectified. Concentration is done by distilling 35% H_2O_2 under vacuum in two stages. Impurities remain in first-stage retort, and pure, hence stable, peroxide can be highly concentrated in second stage to 85%. In stage 2, rundown from rectifying column returns to retort from which final product is drawn. U. S. producers, taking advantage of German advances, are producing 90% H_2O_2.—Chem Eng, Ag, 102

Templet Spots Bridge Piles; 21,000 Linear Ft. Placed

Manufacture and driving of 425 piles totalling 21,000 ft. was completed without a pile being broken and not one being pulled or lengthened on a 2,756-ft. slab-and-girder bridge project in Georgia. Piles varied from 43 to 62 ft. in length. Specifications required driving to a 35-ton bearing and a 15-ft. minimum penetration.

Pile reinforcing consisted of eight 1-in. round deformed bars and No. 6 wire spiral reinforcing. Spacing of the latter varied from 3 in. at tip to 6 in. in body. Steel forms were used, 12 piles being cast in one operation. Concrete had a minimum compressive strength of 3,000 psi. at 28 days. Concrete was poured by chute and vibrated; curing was with a membrane compound. Piles were left 10–14 days at site, curing at least 21 days before driving.

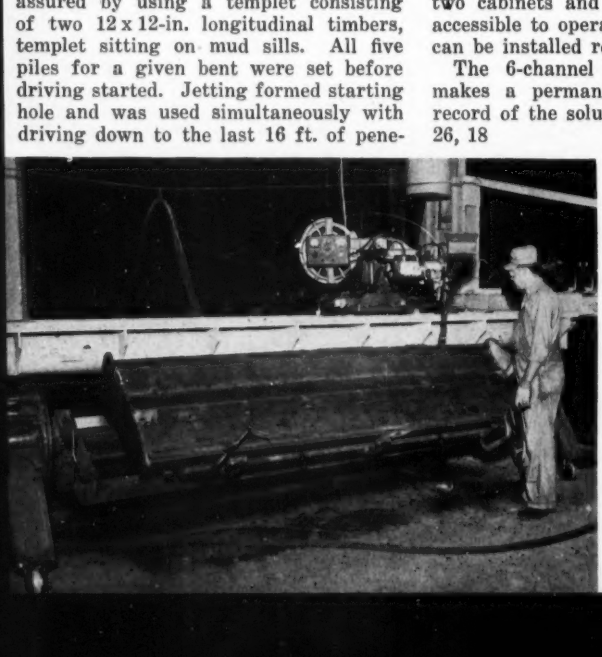
Accurate spotting of bents was assured by using a templet consisting of two 12 x 12-in. longitudinal timbers, templet sitting on mud sills. All five piles for a given bent were set before driving started. Jetting formed starting hole and was used simultaneously with driving down to the last 16 ft. of penetration. Alignment was also improved by first driving one of the verticals near the end and progressing across the bent and returning to the starting end to drive the last batter pile.—Eng News-Rec, Ag 5, 80

Small Electronic Computer

Developed by the Office of Naval Research and the National Advisory Committee for Aeronautics, an office-sized electronic computer is being manufactured by Reeves Instrument Corp. Called the REAC (Reeves electronic analog computer), the unit solves higher order, ordinary linear and non-linear differential equations. Cost of answers is as much as 95% less than hand methods.

Problems requiring 2,949 man-days for calculation can be solved in 108 man-days on the computor—$73,725 compared to $3,240. Unit consists of four cabinets, each requiring about as much floor space as a file cabinet, and the recorder. Only two cabinets and the recorder need be accessible to operator. Two power units can be installed remotely.

The 6-channel oscillograph recorder makes a permanent, directly readable record of the solution.—Aviation Wk, Jl 26, 18



FIXTURE FOR SUBMERGED-ARC

Gar Wood Industries, Inc., applies automatic submerged-arc welding with specially built fixtures. This machine is finishing a bulldozer moldboard. Fabricated of ⅜- and ½-in. plates, seven seams are made at speeds of 10 to 20 ipm. Supporting pipe of carriage is 10 in. in dia., 30 ft. long, and movable vertically or horizontally perpendicular to its axis.—Weld Eng, Ag, 46

Vaporized Aluminum Process Makes Good Lamp Reflectors

Vaporizing of aluminum onto lamp reflectors has replaced silver-plating primarily because of cost. In addition, aluminum does not tarnish, it vaporizes at a relatively low temperature, and it is simpler than conventional chemical plating or electroplating.

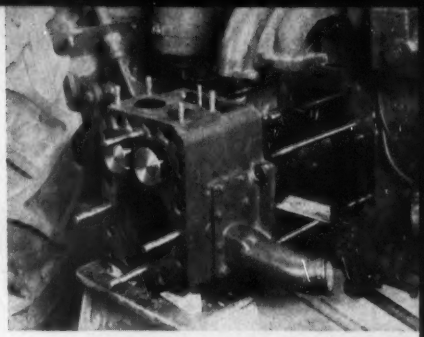
Sylvania Electric Products, Inc., is using the process. To obtain a clear window in a bulb, surface is etched slightly with hydrofluoric acid. Bulb is given an interior coating during the aluminum cycle. Bulb is then turned neck up and a caustic-soda solution removes aluminum from the window. For a frosted window the hydrofluoric etch is heavier.

At General Electric Co. two reflectors are mounted face to face with a tungsten coil between them; reflectors are then sealed. Machine fits 16 set-ups onto a rotating table. As table revolves, a vacuum builds up in each set of reflectors until set reaches firing point where the aluminum strip placed on the coil is vaporized. Vacuum is reduced slowly before reflectors are removed from the table.—Business Wk, Ag 14, 56

Brilliancy Regulates Fire

Klamath Falls, Oregon, plant of Weyerhaeuser Timber Co. has developed and installed an efficient system for burning woodwaste in steam boilers. The system includes measurement of fire brilliancy as a regulating factor in fuel-feed control.

This control is necessary to compensate for differences in fuel conditions—relative amounts of sawdust, shavings and hogged fuel, moisture content, and others. A photoelectric cell in the furnace rear wall measures brilliancy of the flame and gas stream leaving the ditch-oven furnace and, through an averaging relay, works with the steam-flow controller to adjust fuel feed.—Power, Jl, 72



DESIGNED FOR MAINTENANCE

Built by Chamberlain Industries, Ltd., kerosene-powered tractor is designed so cylinder head and barrel are removed from the side of its 2-cylinder, flat opposed engine by loosening nuts from studs in crankcase, exhaust, and inlet manifold faces. Exhaust and inlet valves are accessible from side by removing cylinder head. Maintenance is easy, even if few service facilities are available. Tractor specifications are 41-hp. drawbar pull, nine forward speeds of 1.2-15.1 mph., and three reverse speeds of 1.2-7.83 mph.—Prod Eng, Ag, 102

Cleans Presses by Steam

The Worcester Pressed Steel Co., in trying to keep machines clean, tried soaps, naphtha-base compounds, and other materials; all had limitations. Then a portable steam generator was developed that could operate indoors with no gases, fumes, or dirt.

The generating principle is based on heat caused by resistance of boiler water to flow of current between two electrodes inside the boiler. The unit draws about 20 amp. on 550 v., based on 4–5 min. to build up steam pressure. The heat of the high-pressure steam causes rapid drying of the metal cleaned so there is no condensation and rusting.

Other possible uses are to clean out pits under presses, dry cup-shaped stampings after washing, melt grease on cold days, and service heating radiators in cold spots. Now available commercially, it will produce 9 lb. of steam per hr. with 110 v. or 18 lb. with 220 v.—Am Mach, Jl 1, 111.

NEEDLE-NOSED XS-1, first plane to pass Mach number 1.0. . . .

Design Requirements Revealed

Plane follows conventional aircraft design with a few exceptions. Four motor chambers give pilot control over thrust output

HIGH POWER and low drag determined from the start the design details of the XS-1. Since the plane was designed as a laboratory plane, speed was the primary requirement; armament, combat equipment, vision, maneuverability, serviceability, and cost were disregarded in the design.

Early in the planning phase it was decided that the plane would be of conventional design—only high structural strength, approximately half again the strength of previous designs, and ability to carry test equipment were specified contract requirements.

Conventional wing layout was employed. The 170-sq. ft. wing is 28 ft. tip to tip with an aspect ratio of six. Taper of leading and trailing edge is equal. Lift coefficient is 0.1. Design load is specified at 18. Wing skin is tapered from a root-thickness of about 0.5 in. to a tip-thickness of about 0.125 in. The port wing is perforated by 240 holes, the inserts measuring distribution in flight.

Stabilizer is fitted with a high-pitch screwjack, pneumatically operated, to permit rapid incidence-angle adjustment. Control cables for rudder and elevator are carried in a special fairing atop fuselage.

Cabin is of semi-monocoque design. Double Plexiglas windows have been replaced by plate glass to eliminate heating by air friction. Cabin is pressurized to 3.0 psi. with a leakage of less than 1.0 psi. per hr.

Control wheel is used to give pilot maximum force if needed. Rocket motor selector, instrumentation switches, and emergency power cutoff are mounted on central wheel.

Fuel for the 210-lb. engine weighs 8,177 lb. Oxygen is stored behind pilot in an 0.1875-in. annealed stainless-steel tank. Retractable landing gear is housed directly behind oxygen tank; the alcohol storage tank lies aft of this area. High-pressure nitrogen is used in place of pumps to force fuel to motor. It also operates landing gear, flaps, stabilizer, adjusting system, and numerous valves.

The rocket motor consists of four chambers grouped into the single motor. They

permit an approach to engine throttling not achieved by a 1-chamber motor. Each chamber develops 1,500 lb. thrust, operating at 230 psi. and a combustion temperature of 5000° F. Fuel is circulated through cooling-system jacket before it is injected into motor.

Stability and control, structural loads, and pilot's reactions are carefully checked, the first two in flight. Quantities are read and filmed, and the information is telemetered to the ground.—Aviation Wk, Jl 26, 22

Standard Costs in Bakery

The Mayflower Doughnut Corp., New York, has installed standard cost control to measure shop performance. Direct shop costs cover ingredients, packaging material, labor, and miscellaneous operating expenses.

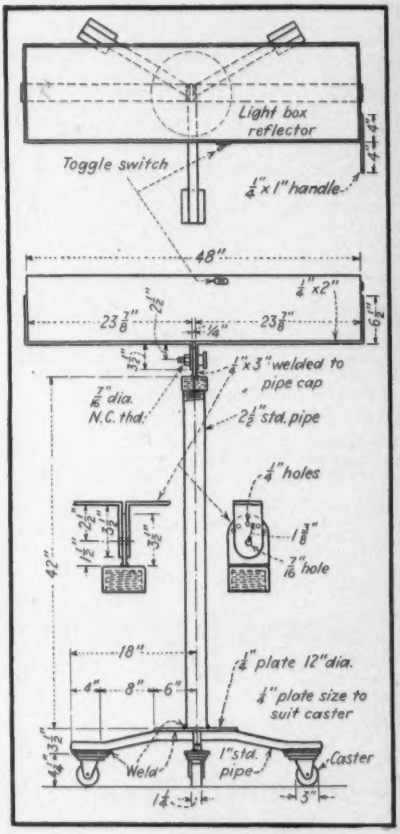
An ingredient-consumption chart has been designed to specify standard mix proportions; this shows ingredient utilization. Labor man-hours have been standardized through time studies. Operating expenses have been budgeted.

All this information gives a comprehensive picture of what to expect of manufacturing costs. Comparison of standards and actual expenditures shows quickly the shop performance. Furthermore, selling price can more readily be established from a thorough, complete knowledge of the standard costs.—Food Ind, Ag, 78

Speed Corrugated Roofing

Cost of laying corrugated sheet-metal roofing on a 400,000-sq. ft. industrial building was reduced 50% by using a special welding gun that permits all work to be done from the topside. Gun was developed by Nelson Stud Welding Corp.

Gun end-welds rivets to steel purlins, the corrugated metal being impaled over the rivets which are upset and rounded off to form a weather-tight seal. Welding time interval is controlled automatically. Gun operates from a standard dc. welding generator.—Eng News-Rec, Ag 5, 88



FLUORESCENTS FOR HOISTS

To provide adequate illumination for work performed on undercarriage of buses on hoists, Capitol Transit Co. designed this fluorescent lamp stand. Four 40-in. industrial tubes are used. Tube length prevents mechanic from casting a shadow on work even if he stands directly in front of the unit.—Bus Trans, Ag, 73

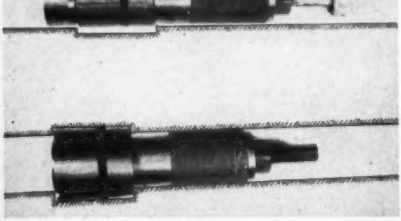
NEW PRODUCTS

Adjustable-tread Tractor — Allis-Chalmers Mfg. Co.'s new model WD 2-plow, general-purpose tractor has automatic rear-wheel tread adjustment, permitting driver to move treads to width desired. Engine clutch controls all power outlets; transmission clutch permits operator to start and stop tractor without stopping power takeoff, belt pulley, or hydraulic system.—Business Wk, Ag 14, 59

Capsule Lifting Magnet—New magnet of Cutler-Hammer, Inc., incases coil in all-metal welded capsule sealed against moisture. Should the magnet become damaged, the capsule coil can be removed and a replacement coil inserted. Pole shoes also are removable.—Elec World, Jl 31, 122

Welder Easily Portable—A 180-amp. machine weighing 502 lb. has been developed by The Lincoln Electric Co. It is powered by air-cooled two-cylinder engine and cooled by fan mounted on generator shaft. Welder can be mounted on shop trailer or a high-speed two-wheeled trailer.—Weld Eng, Ag, 67

Deodorizes, Cleans—A mildly alkaline cleaning powder, Di-Sanite, is soluble in hot or cold water and has wetting, penetrating, detergent and deodorizing ability. It may be applied by sponging, wiping, or mopping. It is a development of Oakite Products, Inc.—Power, Ag, 148



BOREHOLE SAFETY PLUG

Blast or water pressure that might break into working place through diamond drill hole are sealed by this Stewart Machine Co., Canada, expandable safety plug. Plug is inserted and tightened by crank which expands plug.—Eng & Min J, Ag, 110

Soaps One or Both Sides—Soap can be applied to one side, or using tandem arrangement, to both sides of wool or worsted fabrics by a new soaper. Doctor blade controls amount of soap applied. All types of wool or worsteds can be handled at speeds from 20-60 yd. per min. It is a Riggs & Lombard, Inc., development.—Textile World, Ag, 146

Portable Print Labeler—Developed by the Package Machinery Co., the Thermo-Print-Labeler is a versatile unit for many labeling needs. It is automatic, using die-cut labels in roll form.—Food Ind, Ag, 158

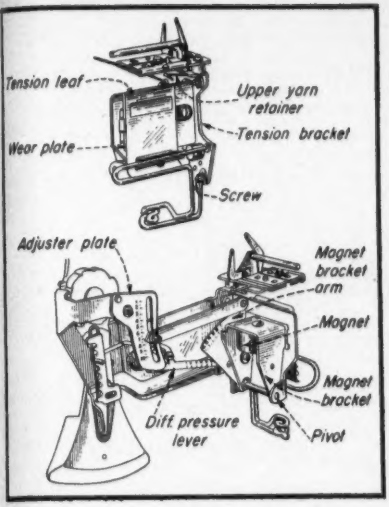
Floating-axle Drum Truck—Floating axle on American Pulley Co.'s hand truck for drums and barrels holds truck upright and ready for use at all times. When loading, truck rides upright to drum, hinged wheels making it possible for loaded truck to stand in a semi-upright position. Wheels are pressed steel with rubber tread.—Ind Dist, Ag, 148

Makes Hand Saw Rigid Tool—Portable electric hand saw is converted to a rigid, precision tool, operating at any angle with a new saw mount designed by Durham Bros. Mount is easily attached to any 6- to 12-in portable saw by bolts through boreplate. Mount is affixed to bench by wing-nuts.—Cons Meth, Ag, 100

Wide-range Wattmeter—New meter measures volts, amperes, and watts over a frequency range of 20-200,000 cps. Eight voltage ranges from 0.1 to 300 v. and 10 current ranges from 0.001 to 30 amp. provide power readings from 100 microwatts to 9 kw. It was developed by Anderson-Fluke Eng. Co.—Electronics, Ag, 132

Shaves Close-shoulder Gears—A conical, involute cutter, announced by National Broach & Machine Co., is designed to overcome the difficulty of restricted cutting action because of the small angle between axes of cutter and gear. The work is tipped away from the cutter to increase the angle. The method is applicable to both spur and helical gears.—Am Mach, Ag, 155

Easier to Wire—New circuit-breaker plug-in panelboard, offered by Square D Co., is claimed to be easier to wire because of the color and number system of branch-circuit terminal marking. It is available for single-phase, 3-wire and 3-phase, 4-wire services with branch circuits of 15, 20, 30, 40 and 50 amp.—Elec West, Jl, 44



MAGNETISM CONTROLS TENSION

Magnetism controls the degree of tension applied when winding yarn in Universal Winding Co.'s Magnetension unit. Tension is applied by a magnetically-attracted leaf against non-magnetic wear plate. Initial tension settings are provided by movement of a permanent magnet toward and away from wear plate. Final tensions are determined by setting of lever attached to transverse frame counterweight.—Textile World, Ag, 142

Takes Temperature—A bonded wire resistance thermometer element for measuring industrial processes, as well as for temperature sensing in telemetering of flight data, has been developed by Ruge-de Forest. Nickel wire grid bonded into a Bakelite wafer is attached to surface to be measured by Bakelite cement.—Aviation Wk, Ag 2, 29

Electrical Tester—Designed for testing circuits and appliances, the instrument measures current consumption, either ac. or dc., while the unit is in operation. Incorporating an ultra-sensitive, direct-reading resistance range, the tester is offered by General Electronic Distributing Co.—Elec C&M, Ag, 101

Flame-failure Device — Instantaneous oil-burner shutdown in flame failure is obtained by photoelectric control made by Combustion Control Corp. The unit has optical system with heat-absorbing filter plus hinged shutter for cleaning lense.—Oper Eng, Ag, 76

Plastic Wire Insulation—Thermoplastic resin replaces rubber as primary insulating material on thermocouple extension wire manufactured by Brown Instrument Co. The polyvinyl chloride permits reduction in overall diameter and provides permanent, stable covering resistant to fading and attack by oils, alcohols, and moisture.—Prod Eng, Ag, 170

Loader, Auger Attachments—A ⅝-yd. shovel, with an 8½-ft. dumping height, for mounting on the front of a small tractor and an auger for rear mounting have been designed by Construction Products Corp. Bucket is interchangeable with fork lift, angle dozer, coal bucket, wide bucket, or crane hook.—Cons Meth, Ag, 100

Glass-plastic Brattice Cloth—Brattice cloth and ventilation tubing made of glass fibers impregnated with plastic is lightweight, fireproof, moisture-proof. It has high resistance to abrasion, bending, and tearing. The Glass Fibers, Inc., cloth is available in all standard brattice sizes.—Coal Age, Ag, 172

Fixture Adds Spotlight—A 2-lamp fluorescent luminaire with matching single incandescent spotlight is announced by Westinghouse Electric Corp. Fixtures are made so spotlight sections can be installed between adjacent fluorescent units. Use is for locations where lower illumination levels are needed than would be provided by continuous rows of 4-lamp fixtures.—Elec World, Ag 7, 29

Single and Double End Boring—Two Bore-Matics are offered by Heald Machine Co. for handling heavy work without special outsize equipment. Single-end model 421 and double-end model 422 have up to 10 hp. available at each end. Maximum table travel is 20 in. Table feed ranges up to 50 ipm.—Am Mach, Jl 29, 138

Gun Solders—Designed by Weller Mfg. Co. for particularly long reach requirements such as telephone multiple maintenance, the 12-in. soldering gun has dual heat at 100 and 135 w. It operates on 115 v. at 60 cycles, has 5-sec. heating, built-in transformer, prefocused spotlight, and trigger switch.—Electronics, Ag, 132

Detects Stray Magnetism—Residual or locked-in magnetism can be detected by any one of three detectors developed by Thomas E. Smith. All three models consist of a pickup unit and detector. Pickup has a magnetic element that responds to strength and direction of the magnetic field. Response is amplified, and direct reading of intensity and direction is given. Unit responds to a deflection of ½° on the compass.—Business Wk, Jl 24, 52

NEW PRODUCTS

TELESCOPING WORK HOLDER

Allen drillpress table at International Harvester Indianapolis Works has a permanently mounted telescoping parallel-bar work holder. Front bar is fastened to 1½-in. rods which fit inside of tubes fastened to rear bar and to blocks bolted to rear edge of table. Set screws hold rods in place to clamp work and prevent rotation.—Am Mach, Jl 29, 78

Measures Flow Characteristics—Flow characteristics of pigment dispersions, ceramic clays dispersions in water, glues, tooth paste, and food products can be measured and charted by Interchemical Corp.'s Viscometer. Unit draws a consistency curve rather than a single-point measurement. Material is placed in a cup and a spring-held bob inserted in it. Speed of cup rotation varies from 10-400 rpm. Curve is made in about 3 min. by changing rotation speed from low to high and back to low.—Business Wk, Jl 31, 38

Axial-flow Pump—Economy Pumps, Inc., has developed a large-capacity, axial-flow pump of corrosion-resistant construction. It is particularly suited to pumping of large liquid volumes, as in condenser circulation.—Chem Eng, Ag, 143

Nylon-coated Wire Rope—In test, Rochester Ropes, Inc.'s nylon-coated steel wire rope broke only one strand after 60,000 reversals, the same test virtually destroying bare steel cable. Coating adds materially to rope's corrosion resistance and fatigue stresses. Price will be comparable to that of stainless-steel cable. Available diameters range from 1/32 to 1 in.—Eng & Min J, Ag, 112

Selenium Rectifier—A heavy-duty rectifier, announced by International Rectifier Corp., has individual selenium elements measuring 6¼ x 7¼ in. and rated at 12 amp. Features include interlocking assemblies of rectifier components, conservatively rated terminals, and special moisture proofing.—Elec C&M, Ag, 99

Chemical Attacks Viruses—Phenosulfazole, a new sulfa drug developed by Calco Chemical & Lederle Labs, has proved effective in combatting viruses—the first chemical to do it. On mice infected with one strain of encephalitis, a virus disease, the chemical was beneficial. It appears to protect a large percentage of mice against lethal infections of neurotropic diseases. Hope is held that the chemical will prove valuable in combatting polio.—Science Ill, S, 17

Ultrasonic Tester—The Metroscope, an ultrasonic device to measure wall thickness from one side and to detect flaws, has been announced by Photocon Research Products. Operation is based on resonant-frequency. Thicknesses of 0.015-0.300 in. may be read directly, up to several inches indirectly.—Elec World, Ag 14, 146

Mechanical-drive Turbine—General Electric Co.'s turbine, type DP, is rated from 10-1,200 hp. and 1,000-5,000 rpm. It can be applied to drive pumps, compressors, fans, blowers, and similar equipment. It has hydraulic governing for wider speed range and more accurate control, and pressure oiling of bearings.—Power, Ag, 120

Armored Tubing Colored—Rub-Bub tubing, developed by Samuel Moore & Co., is intended for structural members of frame furniture, guard rails, color-coded fluid lines. The plastic sleeve, 1/32 in. thick, is easily cleaned, resistant to shocks, and impervious to moisture, salt air, oil, and grease. Armor can be deposited on steel, aluminum, or magnesium tube.—Prod Eng, Ag, 170

MPF in Two New Forms—Multipurpose Food in two bland forms particularly suited for children has been announced by Gentry, Inc. The food—a concentrated, fortified soybean derivative—is high in food value and easily prepared. It is available at cost to supplement inadequate diets of countries suffering from food shortages and undernourishment. —Food Ind, Ag, 116

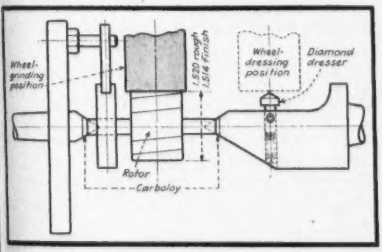
Infrared Seals Bottles—Cel-O sealer, designed by Wuelker Infra Red & Lighting Co., has two rows of infrared lamps focused on the necks of continuously traveling bottles beneath. As they are heated, Cel-O seals, previously slipped on loosely, automatically fasten to bottles. Bottles are carried through 12-ft. section in .29 sec.—Elec West, Jl, 35

Electric Delay Caps—Waterproof and gasless, Western Cartridge Co.'s new electric delay firing cap uses RDX or Cyclonite as its explosive. Made in 10 delays, a zero-delay cap provides an eleventh delay interval. Loaded in a small metal tube, cap needs no vent for ignition. It is available in standard wire lengths, both spool and loop types.—Eng & Min J, Ag, 112

Quick-heat Solderer—Building up to working temperature in 7 sec., a new soldering iron developed by Burgoyne Eng. Co., Ltd., England, uses a special transformer to cut voltage to a potential of only 1/3 v. with a stepped up rate of current flow. Holder for soldering tip is Bakelite. Tip is induction-heated, can be replaced by removing two screws. Gun operates on ac., 50-100 cycle current.—Business Wk, Jl 10, 50

Flame-cutting Machine—Ohmstede Machine Works has announced its model SC-42 flame-cutting machine. Speed ranges from 3 to 30 ipm. Maximum cut thickness is 8 in.; circle cutting range, 0-42 in.; straight-line range, 89 in.—Weld Eng, Ag, 64

Self-cleaning Vacuum—Continental Car-Na-Var Corp.'s new industrial vacuum cleaner is self-cleaning, eliminating dust bag or tank cleaning. Water trap catches dust. To clean, clear water is sucked into tank and ejected through intake hose carrying out dirt. Cleaning takes 1 min.—Bus Trans, Ag, 174



GRINDS ALNICO ROTORS

Grinding Alnico magnet rotors for aircraft generators was originally done at General Electric Co. on one machine for both roughing and finishing. Two machines are now used, the one for roughing having an oscillating spindle. Tailstock centers are cut away and a diamond installed in each one. When wheel is dressed and the stops left as they are on completion of dressing, the rotor is ground within desired limits—0.0005 in. on finished size. New method resulted in 500% production increase per man-hour.—Am Mach, Ag 12, 94

Fumigates Grain—Known as Dowfume EB-5 and developed by Dow Chemical Co., the fumigant contains 5% ethylene dibromide in chlorinated solvent. High penetrating powers and toxicity make product excellent for controlling pests in all levels of a bin.—Food Ind, Ag, 155

Plastic Specialties—U. S. Rubber Co. has announced a corrosion-proof pipe with no metal or fabric reinforcement and a non-splitting cutting block for use on guillotine cutter. Both are made from Kralite, company's new synthetic rubber-thermoplastic resin blend.—Chem Eng, Ag, 168

Decorticates Wet or Dry Fiber—Fiber Industries' Fibracator handles wet or dry fiber, decortication being accompanied by reducing plant stalk to a uniform ribbon by rolling plants through rubber rollers. Rollers also dejuice stalks. Cuticle is nicked and then stripped by blades. Action is similar on layers beneath cuticle.—Textile World, Ag, 228

Ladder Step—Fitting any standard rung ladder, an adjustable cast-aluminum ladder step has been developed by Beauideal, Inc. Step is oak safety tread 11¼x10¾ in. Aluminum arc permits adjusting of step incline.—Factory, Ag, 218

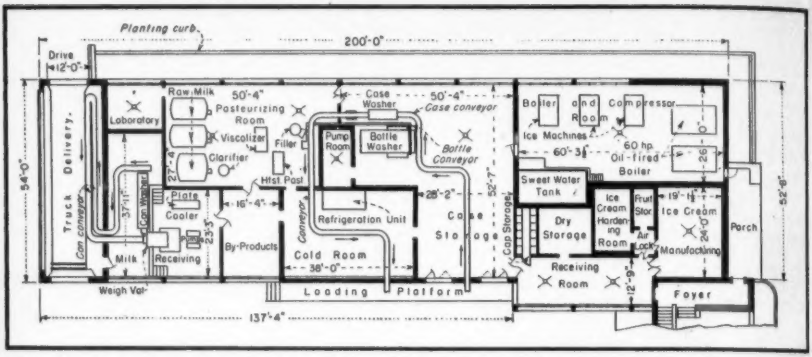
Plates in Vacuum—Plating metals and metal fluorides in a vacuum by evaporation is done in L. L. Constantin & Co.'s new plating machine. It finds application in base plating quartz, mica, and ceramics.—Electronics, Ag, 179

Brake-shoe Lining—A brake shoe with clamp-on lining for use with magnetic brakes for mill and heavy-duty service has been developed by Cutler-Hammer, Inc. The asbestos lining, when worn, is easily and quickly replaced with a new lining.—Oper Eng, Ag, 66

Controls Street Lighting—Photoelectric control, announced by The Fisher-Pierce Co., regulates all types of outdoor lighting according to preset values of daylight intensity. Standard turn-on adjustment is 0.5 ft.-c. with turn-off at 1.25 ft.-c.—Elec World, Jl 24, 29

FREE SERVICE TO READERS

As a special service to our subscribers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y., U. S. A. —*THE EDITORS*



EFFICIENT, integrated operation of new dairy was assured by . . .

Advanced Dairy Engineering

New dairy plant features an efficient floor plan, concealed utility lines, latest equipment to make it model of advanced engineering practice

TOMORROW'S PROFITS can be read in today's blueprint of processes and operations. But cost cutting is only one of many advantages of better plant engineering. Others are better quality, improved sanitation, increased capacity, better working conditions, improved public relations.

The new Farmers & Consumers Dairy in Morristown, N. J., well illustrates modern, advanced design. The one-story plant has its process piping held to a minimum by careful placement of equipment and an efficient floor plan. Equipment and piping are readily accessible for daily dismantling, cleaning, and sterilizing. An important feature is that milk is pumped only twice, thus holding agitation to a minimum.

To overcome a condensation problem resulting from large amounts of steam liberated in processing, the plant is completely air-conditioned. Product cooling is done with well water and 32° F. sweet water. Sweetwater temperature is maintained by a latent heat plant in the engine room. Milk storage is held at 36° F. by a floor-type blower unit and an ammonia compressor. Another compressor provides refrigeration for the ice-cream department.

An unusual feature of dairy-plant design is elimination of utility pipe lines from walls and ceilings of processing rooms. They are suspended from the steel roof rafters and run above room ceilings.

Milk cans (10 gal.) are unloaded from trucks and conveyed to receiving where the milk is dumped and weighed. Empty cans and lids are put through a can washer and conveyed back to the loading dock. The milk is pumped from the weighing tank through a plate-type cooler, which cools it to 34° F., and then into storage.

Raw milk is pumped through the clarifier and plate-type high-temperature, short-time (HTST) pasteurizer, in which it is cooled to 34° F. before being discharged into balance tanks on a mezzanine directly behind the filler. Milk flows by gravity to filler. Homogenized milk is produced by viscolizing the hot

milk between heating and cooling cycles in the pasteurizing operation.

Milk bottles are washed in a 10-wide soaker-type washer, and carried by chain conveyor to the filler. Empty cases are conveyed to a case washer and then to the filler. Cased milk is conveyed to milk storage.

For ice cream, mix is made in the milk-processing room and moved to the freezing room in 50-gal. tanks. Here it is frozen in a 75-gph. Vogt freezer, then hardened and stored in the hardening room.—Food Ind, Ag, 67

Bores Aluminum Castings

Cast-aluminum pressure cookers are counter-bored, at Stewart Die Casting Co., with single-point, carbide-tipped tools at speeds ranging up to 3,400 sfpm. The operation includes taper boring the walls and facing the bottom in one continuous cut on a No. 12 Gisholt automatic lathe. The machine has an auxiliary toolslide on which is mounted a heavy boring bar that can be bolted in various positions to suit several sizes of castings.

A roller on the auxiliary toolslide follows a taper cam bar at rear of lathe to guide the tool. At bottom of cut, the slide passes off the guide bar and moves across the lathe to face the bottom of the pot. The independent tool slide controls forward and backward motions.

A special pot chuck holds the casting. Spring-supported floating centering rings and clamping fingers adapt it for four sizes of cookers. The chuck is air operated by a drawbar extending through the lathe spindle and connecting with a spider that has three push-rod-operated arms.—Am Mach, Ag 12, 90

SHAVES CUTS

Steep slopes on road banks are shaved off by Caterpillar diesel motor grader, the blade operating in an almost vertical position. Hyde Construction Co. has been using this procedure along Mississippi Roads.—Cons Meth, Ag, 98

Pole-Top Stringing

Extension of overhead distribution lines of San Diego Gas & Electric Co. has been speeded by a new way of stringing conductors. A 20-ft. service pole, which has three snatch blocks secured to its upper end, is lashed at an angle to the boom on a boom truck.

Three conductors are passed from reels on the truck through the blocks and fastened to the first pole in the line to be strung. The truck then drives along the line, stringing the conductors from pole to pole. Where a truck can follow the line of poles, this method can save at least half the stringing time.—Elec West, Jl, 64

Synthetic Mica Developed

Synthetic mica, with electrical, chemical and physical characteristics duplicating those of natural mica, has been developed by the Office of Naval Research. Pilot-plant production is underway. The fluorine-phlogophite crystals cleaves perfectly into thin sheets. Researchers hope to make it into sheets according to specifications, which would eliminate sorting, grading, splitting, and trimming necessary with natural mica.—Business Wk, Ag 14, 52

Feedwater Treatment Removes Coloring Matter

Frazier Companies Ltd. at Edmunston, Canada, was faced with considerable organic color matter in the makeup water for its steam plant. Softening alone would have been unsatisfactory, so an installation was made to remove the organic matter first.

The process involves coagulation with ferric sulphate at 4 pH, followed by filtration to remove color and turbidity. The coagulating and filtering equipment consists of two complete units, each designed to handle 270 gpm. Retention time in mixing chambers is about 30 min. and in settling basins about 2 hr.

Each mixing chamber has four compartments through which the water flows in series. Mechanical agitation in the first gives good mixing and promotes floc formation. Filters are gravity type with Wheeler bottoms; filter rate is about 2½ gpm. per sq. ft.

After filtering, caustic is added to raise the pH. The water then enters a clear well from which it is pumped to zeolite softeners, deaerators, and finally to the boilers. Removing the organic matter before softening prevents clogging up the zeolite bed, avoids its inhibiting the softening action, and eliminates the possibility of its causing trouble from foaming and carryover.—Power, Ag, 92

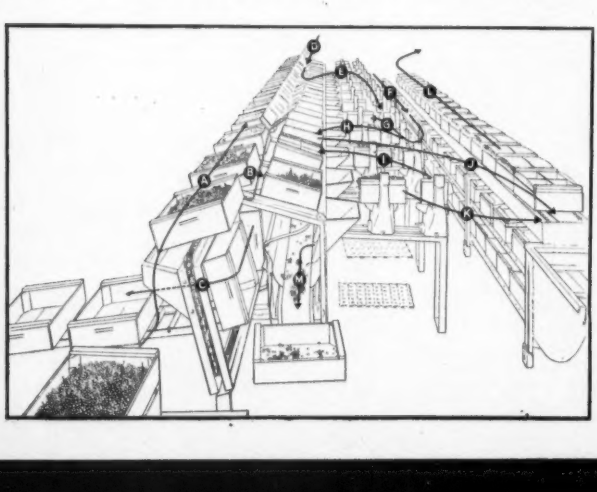
Electrostatic Detearing

Paint tears, or droplets, can be pulled from freshly painted parts by passing such parts over an electrostatically charged metal grid. The work is grounded and positive, while the grid is negative and maintained at 85,000 v.

An attractive force is thus exerted on the work and any excess paint is drawn to the grid from drainoff points. Deteared parts have a uniform surface.

Precautions necessary are to ground the work and to keep it at least 8 in. from the grid. Otherwise the unit will be de-energized because of the tendency to create a static spark, and painted parts will not be deteared.

Electrostatic painting is a reversal of detearing. Parts are passed through a highly charged electrostatic field with the grid at about 100,000 v. As sprayed paint particles enter the charged zone they are attracted to the work.—Am Mach, Jl 15, 97; Jl 29, 89



PACKS GRAPES

Packer, developed by General Nailing Machine Corp., operates thus: (A) field boxes go on conveyor. (B) pulled on packing rack; (C) empties underneath. (D) 2-lb. cartons go on rack. (E) placed on scales. (F) 28-lb. lugs come in. (G) some go on scales. (H) some on rack. (I) filled cartons packed in boxes. (J) filled boxes to conveyor. (K) filled lugs to conveyor. (L) boxes to nailer. (M) cuts chuted to conveyor.—Food Ind, Ag, 104

Naval Research Lab Studies Gating Systems

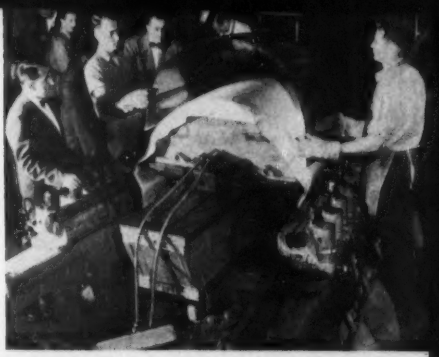
Results of research conducted on gating practices at the U. S. Naval Research Laboratory were reported at the 1948 annual meeting of the American Foundrymen's Association. The program consisted of photographing in slow motion the flow of molten steel when using different designs of various types of gates. Observations of top pouring, whirl gating, and riser gating show considerable turbulence, with least for riser gating. In finger gating, when finger area is twice sprue area, all fingers do not feed uniformly and the casting surface shows a swirling form of turbulence opposite the finger feeding the most. Equal areas provide uniform feed and rolling turbulence throughout length of casting.

Horn gates also feed non-uniformly, with fingers farthest from sprue doing the most feeding. Reversed horn gates do not decrease turbulence appreciably. The gating system that produced the least turbulence of all studied is a bottom side gate, consisting of a trap placed in system in advance of the casting. This decreases velocity of incoming metal so it enters evenly.—Prod Eng, Ag, 129

High Efficiency in New Mine

Per ton output per employee at Floyd Elkhorn Coal Co. is 12.3 tons or 24 tons per faceman per shift. High efficiency is the reason. Two track-mounted loaders work the 54-in. average seam, delivering directly to 3-ton, drop-bottom mine cars. Loader is low (24½ in.), rubber-tired, with hydraulic drives and a boom having swivel tail jack so coal is discharged without attention of operator.

Track-mounted machines do bottom cutting. All drilling is by track-mounted units. A 6-ton cable-reel locomotive serves each loader, car-changing distance being 90-180 ft. All entries are driven 22 ft. wide. Rooms are turned at a 45° angle on 35-ft. centers, room pillars being left.—Coal Age, Ag, 80



SPUN GLASS AIDS METAL FORMING

Spun glass, woven into thin blankets, is used as a substitute for graphite or grease between metal sheet and stretch block in stretchpressing magnesium sheet at Glenn L. Martin. Blanket is 0.027 in. thick. Glass blanket has high heat resistance and high tensile strength. Hard, smooth surface provides good sliding action; heat loss from material to forming block is reduced. Using graphite it took 70.1 min. to form sheets; with the glass blanket it takes 4.9 min.—Aviation Wk, Jl 26, 27

New Ion-Exchange Resins

Four new ion-exchange resins have been developed by Resinous Products & Chemical Co. Amberlite IRA-400 makes reverse deionization practical. In this process, the solution to be deionized is first passed through an anion exchanger, then through a cation exchanger. This holds the solution alkaline at all times.

Amberlite IRC-50 is a weak cation exchanger of the carboxylic type. By buffering action, the resin can be converted to a combined salt-acid form to get cation exchange at a controlled pH. This allows separation of closely similar chemicals, such as the amino acids.

The other two resins, Amberlite IR-120 and IR-105, are high-capacity, sulphonic-acid types of cation exchange resins.—Chem Eng, Ag, 163

Knock-offs Cut Labor, Waste

Automatic knock-off on frames spinning filling yarn has reduced battery hand labor and bobbin-tail waste at Beaumont Mfg. Co. Since installation, bobbins have been filled uniformly from doff to doff and yarn tails have been shorter and more uniform. Filler waste at loom has been cut; runover doffs eliminated; spinner's time saved; doffer's time reduced by pulling down ring rail automatically.

The doff control, developed by Numo Machine & Engrg. Co., is pneumatic, controlled through valves and actuating triggers—mill's regular lines providing compressed air. Knock-off has one or two valves depending on bobbin build, one or two cylinders depending on spinning frame drive, and connecting tubing connecting valves, cylinders, and compressed-air line.

Both winding height on the bobbin and rail-lowering speed are adjustable. After frame is doffed, starting requires only release of ring catch, winding back the rack, shaking out rail to clean traverse, and pulling shipper handle. — Textile World, Ag, 121

Machines in Duplicate

A new automatic transfer machine, built by Cross Co., performs 14 operations at once on 28 transmission gear-shift housings. Producing about 175 housings per hr. at 80% efficiency, the machine needs only one operator who loads parts and presses the control button.

Grooves at top and bottom of the fixture extend the length of the machine and act as guides from beginning to end.

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Fuller & Smith & Ross, Inc.

They receive two parts at the loading station, making a total of 30 housings spaced and held in position by 30 fingers attached to a pivoting transfer bar. When the bar moves forward, all parts advance one station. The bar then pivots disengaging the transfer fingers, and returns to starting position where fingers rock back into engagement.

A feature of the machine is automatic tap cleaning and lubrication. At end of each cycle, a blast of air, into which a vaporizing device introduces oil, is directed at each tap to remove chips and lubricate it.—Am Mach, Ag 12, 122

STUDYING the old method is the first step to . . .

WORK SIMPLIFICATION—
Answer to High Cost, Low Output

TODAY, AS NEVER BEFORE, methods improvement leading to increased operating efficiency is being scanned eagerly by alert managements in an effort to reduce production costs. To counteract rising material and labor bills, to try to keep their goods at a price that the consumer can pay, these same managements—no matter what industries they may be in—are searching out new, cheaper, quicker, easier methods.

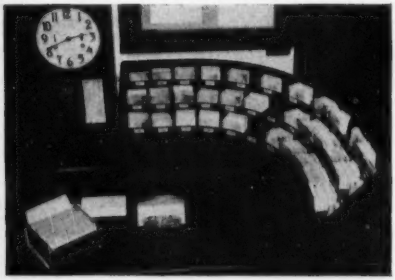
Whether the program may be called work simplification or methods improvement, it still adds up to the same objective: To do the job the way it should be done. The tools the methods engineer uses in this work include the stop watch, standard times, act breakdown chart, sequence chart, motion-picture camera, operator training sheets, mockups, scale models, and his own ingenuity.

In his analysis of an operation, the methods engineer asks himself these questions: Why is it necessary? What is its purpose? Where and when should it be done? Who should do it? And finally, what is the best way to do it? From this, he goes on to: Break down the job into its details. Question each detail. Work out a better method. Put it to work.

In analyzing the job and developing an improved, simplified method, the engineer must consider layout, handling, safety, machine and tool design, product design, package design, retraining of workers, and, not least of all, the cost.

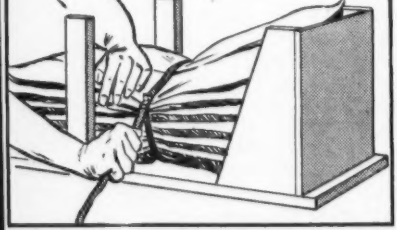
Work simplification is applicable to all industries, although many do not use the term itself. Metalworking, textile manufacturing, food processing, construction work—all these and more benefit from applying its principles. In the following pages, examples selected from various McGraw-Hill publications are shown in picture form to indicate how readily it may be used in any industry.

Work Simplification — General Industry Examples

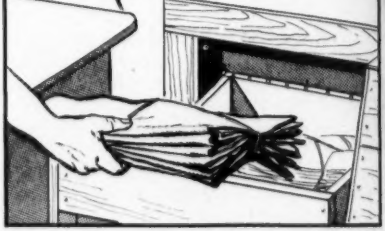


WORK SIMPLIFICATION principles are embodied in control desk in use at Republic Steel Corp. for handling paperwork connected with shop-incentive system. Racks, clock, and work-assignment window (at left) are arranged within easy reach of the clerk. The curved holder contains a separate compartment for each machine tool in the shop. Filed cards, representing work ahead for the various machines, are arranged according to work schedule so quick assignment of jobs can be made to machine operators.

METHODS IMPROVEMENT that emphasizes safety for the operator was devised at the Micro Switch Division, First Industrial Corp. A magnetic anchor holds a transparent plastic guard to work surface on a screw machine. The guard can be moved simply by lifting or sliding, and is adjustable to many positions on numerous machines. Result of this improvement is that the operator can see the work, but is protected against flying chips and oil spray. The work place is cleaner, no safety goggles are needed.



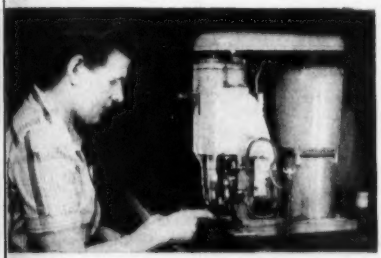
STRAP AND JIG here speed tying bundles of ladies' foundation garments at Charis Corp., but the idea can be applied widely. With 12 garments to the bundle, the strap secures each bundle between as many as 70 operations from cutting to shipping. Garments are packed in individual bags. As each garment is packed, it is placed in the jig, the strap being laid across the jig before the first bag is in place. After all 12 bags are piled, they are secured by the strap and the bundle is ready for the shipping room. Operators lose no time in tying and untying bundles. Straps and jig returned their cost in less than a year, and loss of sections of garments was eliminated.



HOLE IN WALL speeds package moving at Dutchess Underwear Corp. In the old method, garments were packed in bags which were tied together, six at a time, by machine. Packages were moved by truck about 150 ft. to the shipping department which was on the floor below. Improvement was made by cutting an 18-in. square hole through the wall to the right of the tying machine and building a wooden chute to the floor below. The machine operator drops bundles down the chute where they are collected in a bin. Two stock boys were released from truck pushing to other jobs. The chute paid off its initial cost in less than 2 wk. in direct labor savings alone.

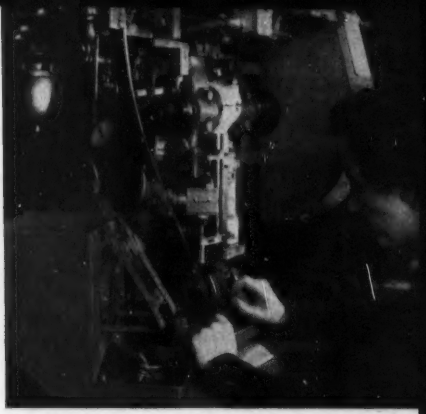
Work Simplification—Assembly

TILTING-PLATE fixture, at Westinghouse Electric Corp. Buffalo plant, holds rotor assembly vertical for shrinking and allows easy removal after core is cooled. Finished rotors are placed in pockets of an overhead chain conveyor (right foreground).



TWIN SCREWDRIVERS, replacing electric driver on assembly job at Micro Switch, doubled production with conveyor feed.

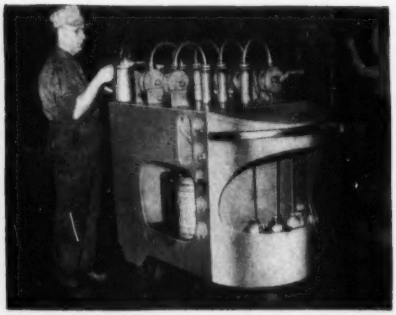
ARMATURE lead wires at Micro Switch are dipped in stripping compound to soften enamel coating, dried on center rack, and placed in jig where coating is brushed off.



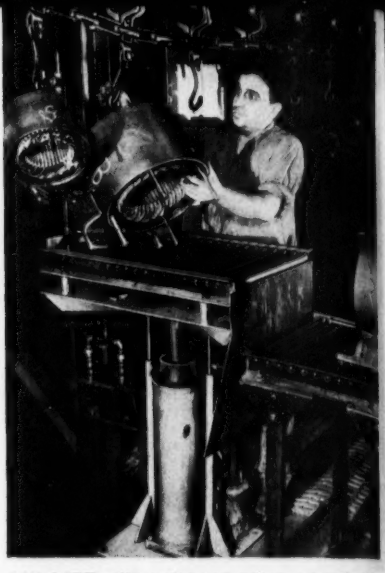
SUBASSEMBLY operation of silver contacts to springs at Micro Switch is done by machine. Contacts are fed from a hopper to the press by slide. Operator places spring from bin (at left) on contact in the press, trips press with pedal, and repeats operation. The downward press stroke does the riveting. Assembled parts are raised by two pins and blown by air into trough. Output rose from 450 to 1,430 pieces per hr.

POWER OPERATION of turntable holding copper pin and rotor for welding at Apex Electrical Mfg. Co. has increased output by 42% and resulted in better welds with practically no rejects. Turntable is rotated by dc. motor, while welder is held in special jig for positioning over work. Elimination of manual handling frees operator to concentrate on work, reduces his fatigue.

Work Simplification—Handling



THREE-WHEELED cart at Allis-Chalmers Springfield works moves tanks, hand pumps, and oils around plant for scheduled oiling of machines. Lubrication points are identified by numbered disks for type of oil.

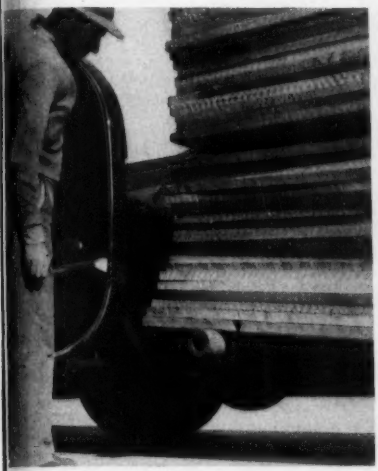


AIR LIFT with roller top raises wound stators at Westinghouse Buffalo plant to correct height for hooking onto overhead conveyor which carries them through baking ovens and thermoset varnish dips for insulating coils. Foot-operated valve provides easy control of lift, leaving operator's hands free for handling stators delivered by conveyor at the right from the winding and connecting groups.

DIE SETTERS at Worcester Press Steel Co. use heavily built, castered tables of press-bed height and with built-in tool drawers.

KEYTOP PAINTING at Friden Calculating Machine Co. has been conveyorized to halve production time. First operator (at right) feeds keytops on double-pin fixtures, second daubs on paint, third and fourth wipe off excess, and fifth and sixth clean tops with solvent. Tops are ejected by felt guides that taper up to lift tops off the pins so air can blow them into side chutes.

Work Simplification—Construction



LUMBER-TRUCK UNLOADER, at Penberthy Lumber Co., consists of arm and extra roller supporting tail end of load, pivoted under rear end of chassis and held by hydraulic cylinder to bell crank. Load is rolled back until front of load rests on arm and is lowered to ground.

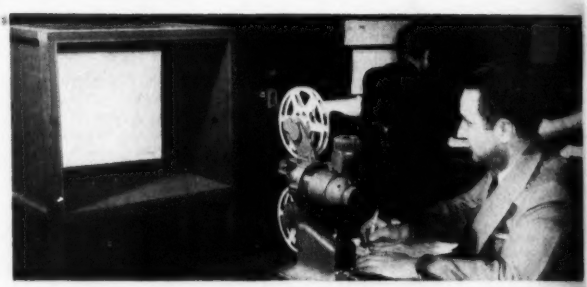
TIMBER CHUTE saved time and money for contractors J. A. Terteling & Sons at Columbia Basin canal. About 8½ tons of explosives were lowered 90 ft. down the chute to the bottom of the canal for loading into a coyote hole to blast out a 35,000 cu. yd. plug of solid rock left as a roadway.

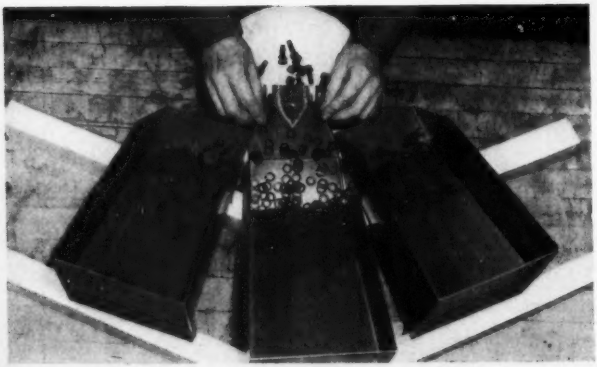
SPREADER for spacing wire rope slings facilitates the handling of lumber in unit loads or "packages." The Wicker Lumber Co. is here using in its yard a Link-Belt Speeder mobile Cargocrane, together with a tractor and two-wheeled yard wagon for carrying the lumber.

How Oldsmobile Div., General Motors Corp., Improves Methods

1 Methods engineer at Oldsmobile, after discussing with the department foreman the job that needs improvement (in this case, assembly of bolt and washer used on periphery of Hydra-matic flywheel cover), makes sequence chart of present method. All job requirements, together with quality and quantity standards, are listed in complete detail.

2 Micro-motion studies are also made, and film is spliced to form a continuous loop. The engineer analyzes the operation at his leisure and can make notes easily as the hooded screen makes viewing the film possible in full light. Film can be projected at normal working speed, slow speed, or frame-by-frame.

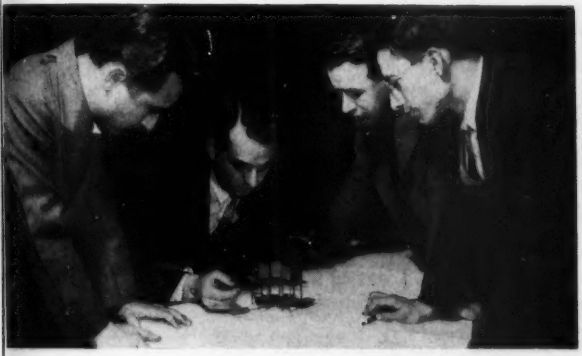




3 After the paper analysis has been made from sequence chart and micro-motion study, the engineer plans a tentative "better method." A mockup, or dummy, is built in the methods laboratory, so the method can be given a trial run to work out all the errors and permit further improvement and experimentation if necessary.

4 The "better method" is reviewed by methods supervisor. All other departments affected by change are consulted.

5 Department foreman, who has been consulted during development, is also called in to give final approval to the new method.



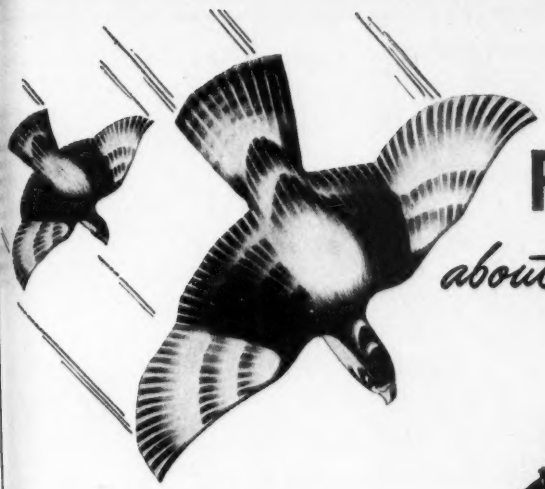
6 Scale model of the new workplace (in this case there is no additional equipment) is built to provide ready visualization. Layout men and methods engineers study the model to determine changes in facilities required to permit installation of the new method in the plant.

7 Once the new improved method is approved by all concerned—layout men, methods engineers, and production personnel—the methods department builds a workplace exactly as it will be used on the production floor. This again permits further study and elimination of any defects that might hold up production when the method is released to the production department.

8 Final pre-production step is to review in detail the new setup with the plant superintendent. When he approves the method, the job of actual transition of process and equipment into production is planned with affected departments.

9 Operators are trained by the foreman as the new setups are moved to the production floor. The training sheet (see arrow) provides complete instruction and is kept permanently at the workplace. The methods engineer visits the setup occasionally to find out whether anything has developed which might prevent the new arrangement from functioning as planned.

10 Last step in the job improvement project is checking and setting a new rate by time-study man. When this rate is approved and placed in effect, the process is complete. Simple as this change seems, Oldsmobile benefited by 100% increase in production per man-hr. for the operation.



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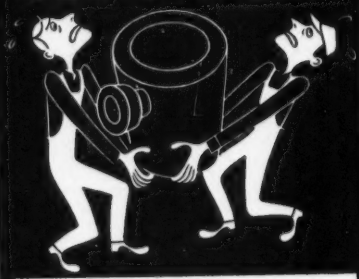
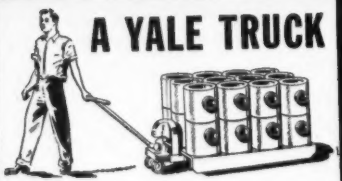


A YALE TRUCK



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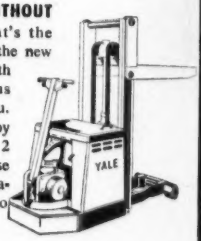

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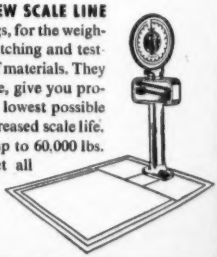

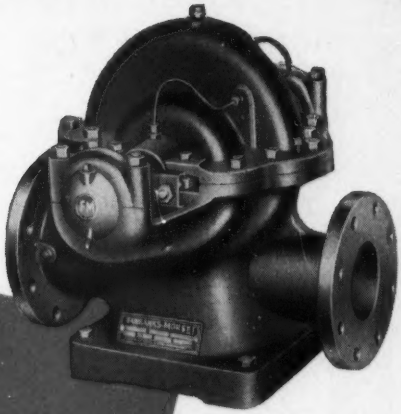

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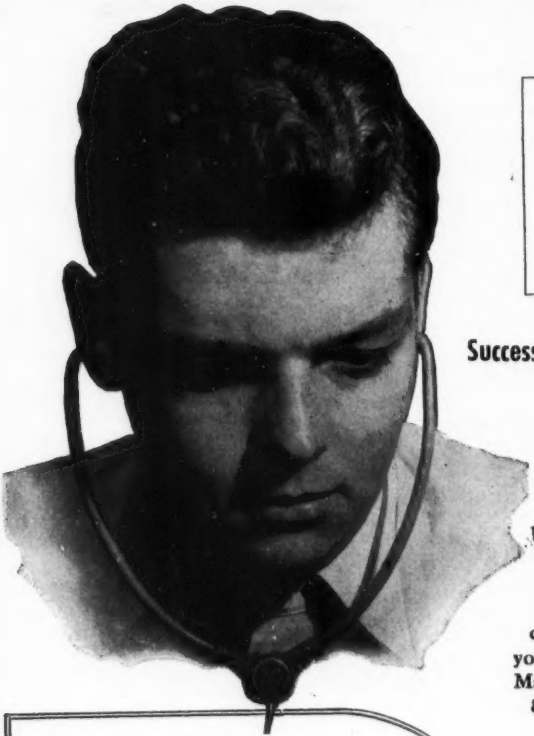

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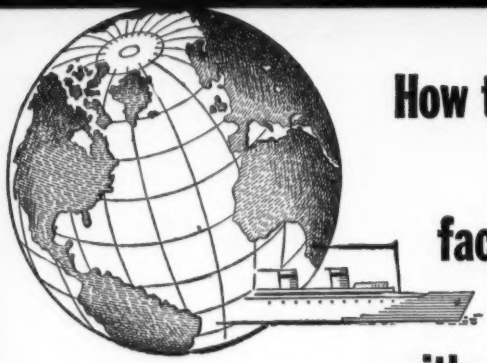

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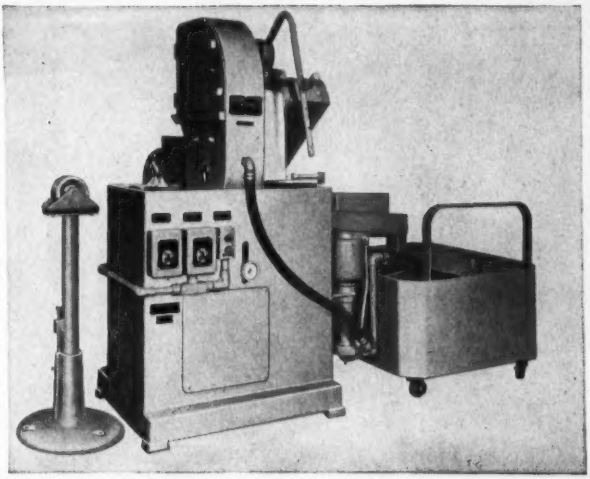

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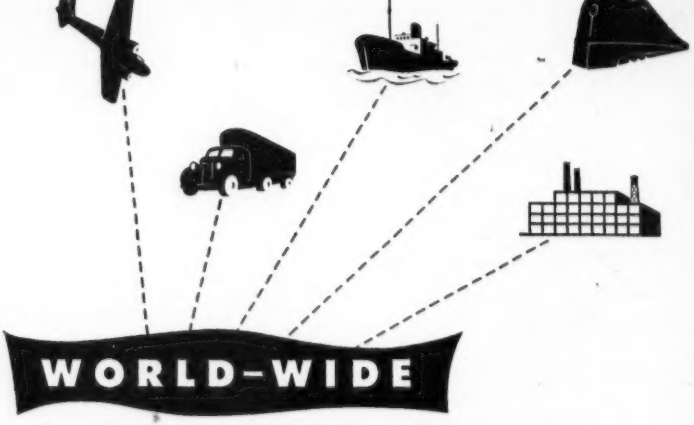

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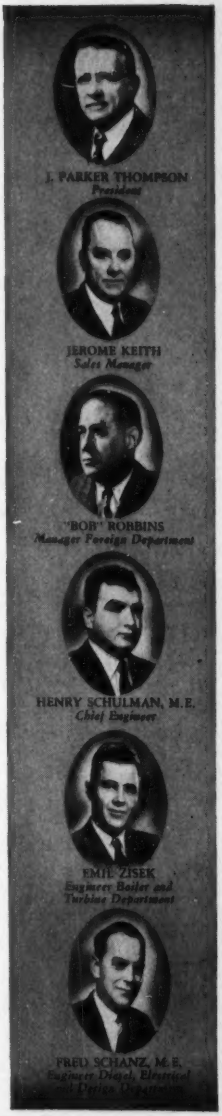

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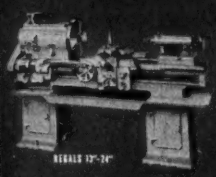
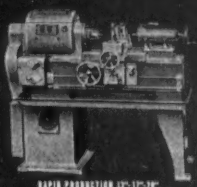
10 East 49th St., Dept. 740, New York 17, N. Y., U.S.A.

CABLE ADDRESS: Genamint, New York

TRADE

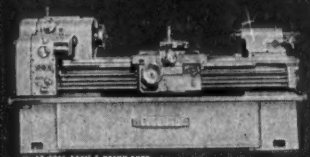


REGALS 12"-24"

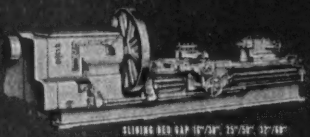


RAPID PRODUCTION 12"-17"-20"

DUAL DRIVE



16" AT TOOL ROOM & HEAVY DUTY



SLIDING BED GAP 16"/24", 25"/34", 32"/42"

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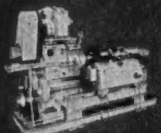


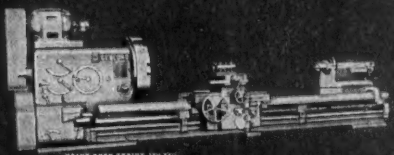
AUTOMATIC 12"-16"

HEAVY DUTY ENGINE 17"-32"

No. 2 CUTTER GRINDER

UNIVERSAL CRANKSHAFT 28"-38"

HOLLOW SPINDLE 18"-38"



HEAVY DUTY ENGINE 42"-58"

AUTOMATIC CRANKSHAFT

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